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RECOMMENDED CITATION

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# TABLE OF CONTENTS

## INTRODUCTION
- What is Disturbance ......................................................................................................................... 1
- Why Does Disturbance Matter .............................................................................................................. 1
- Why Focus on Beach Walking and Dog Walking .................................................................................. 2
- Document Purpose ............................................................................................................................... 2
- Approach .............................................................................................................................................. 2

## DATA-INFORMED MANAGEMENT NEEDS
- Atlantic Flyway Disturbance Project: Social Science Report: Part I - Land Manager Survey .................... 4
- Development ........................................................................................................................................... 5
- Atlantic Flyway Disturbance Project: Biological Data Collection Report ................................................ 5
- Co-Production Workshop ..................................................................................................................... 6
- Community Based Social Marketing Case Studies .................................................................................. 6

## COMMUNITY BASED SOCIAL MARKETING
- What is Community Based Social Marketing .......................................................................................... 8
- CBSM Primer ........................................................................................................................................... 9
- CBSM Case Studies ............................................................................................................................... 14
- Focus On Dog Walking And Beach Walking In A CBSM Campaign ....................................................... 23
- Benefits And Constraints To Voluntarily Leashing Dogs Near Shorebirds .............................................. 24
- Benefits And Constraints To Voluntarily Walking Around Shorebird Flocks .......................................... 25

## STRATEGIES
- Recommended Strategies From Community-Based Social Marketing ..................................................... 26
- Addressing Disturbance Through Co-Produced Strategies ..................................................................... 27
- Choosing A Zoning Strategy Versus A CBSM Strategy ........................................................................... 27
- Strategies to Address Disturbance from Beach Walking ........................................................................ 29
  - Strategy #1: Communication (Combined With Strategy #6: Social Diffusion) ...................................... 30
  - Strategy #2: Social Norms .................................................................................................................... 33
  - Strategy #3: Commitment ....................................................................................................................... 35
  - Strategy #4: Prompts .............................................................................................................................. 36
  - Strategy #5: Incentives ............................................................................................................................ 37
  - Strategy #7: Convenience ...................................................................................................................... 38
Strategies to Address Dog Related Disturbance

Strategy #1: Communication
Creating Interpretive Signs

Strategy #2: Social Norms (Combined With Strategy #6: Social Diffusion)

Strategy #3: Commitment

Strategy #4: Prompts

Strategy #5: Incentives

Strategy #7: Convenience

Beyond Community Based Social Marketing

MORE TIPS FOR IMPLEMENTING STRATEGIES

Creating Partnerships
Covid-19 Considerations

MOVING FORWARD

Implementation Plan
Monitoring Plan

APPENDIX A: EXISTING RESOURCES

REFERENCES
INTRODUCTION

WHAT IS DISTURBANCE?
Over the last forty years, shorebird populations across North America have declined by 70% (NABCI, 2016). A key factor contributing to this decline is human disturbance. According to a shared definition developed by managers and biologists, human disturbance is “a human activity that causes an individual or group of shorebirds to alter their normal behavior, leading to an additional energy expenditure by the birds. It disrupts or prevents shorebirds from effectively using important habitats and from conducting the activities of their annual cycle that would occur in the absence of humans. Productivity and survival rates may also be reduced” (Mengak & Dayer, 2020). Disturbance from human activities is sometimes intentional, but disturbance can also result from unintentional actions by beach users. Human activities that may disturb shorebirds include direct harassment, dogs, beach raking, coastal engineering, general beachgoing, events, recreational fishing and shellfishing, motorized watersports, commercial fishing and aquaculture, unmanned aircraft, and wind powered aircraft (Mengak & Dayer, 2020).

WHY DOES DISTURBANCE MATTER?
Human disturbance has been identified as one of the key mortality sources of Atlantic Flyway Shorebirds (Atlantic Flyway Shorebird Initiative [AFSI], 2015). Disturbance can impact shorebirds throughout the entire annual cycle. During the breeding season, disturbance can degrade the quality of nesting habitat (Lafferty et al., 2006). Flushed adult shorebirds have decreased nest attendance (Verhulst et al., 2001; Weston & Elgar, 2007) and reduced incubation rates (McGowan & Simons, 2006; Sabine et al., 2008; Borneman et al., 2016). As a result of reduced incubation, eggs can be more susceptible to thermal stress, which can lead to nest failure (Sabine et al., 2008). In addition to indirect impacts, disturbance can result in direct mortality of adults, chicks, and nests (Melvin et al., 1994; Weston et al., 2012; Schulte & Simons, 2015; Sabine, et al., 2006; 2008).

Disturbance during the nonbreeding season can also have significant impacts on the survival and fitness of shorebirds. Disturbance can initiate flight response (Lethlean et al., 2017; Ramli & Norazlimi, 2017; Mayo et al., 2015; Tingco, 2011; Esrom, 2004; Lafferty, 2001; Harrington & Drilling, 1996; Burger, 1981; 1986) and displace shorebirds from important habitats (Linssen et al., 2019; Stigner et al., 2016; Burger et al., 2015; Burger & Niles, 2014; Tarr et al., 2010; Burger, 1988). Disturbance can increase vigilance while roosting (Hatch, 1997), reduce foraging time (Forgues, 2010; Burton et al., 2002), reduce prey availability (Schlacher et al., 2016), and subsequently decrease feeding rates (Navedo et al., 2019; Harrington, 2005; Yasué, 2005; Paton et al., 2000). The negative impacts of disturbance can have severe energetic costs for individual shorebirds (Rogers et al., 2006), such as reduced body mass, and can lead to lower annual survival rates of individuals at disturbed sites (Gibson et al., 2019). When extrinsic factors, such as disturbance, are experienced by shorebirds during the non-breeding season, their ability to reproduce during the breeding season can be influenced (Weithman et al., 2017).
The impacts of disturbance will likely increase in the future as the population of people in coastal areas is projected to grow (NOAA, 2013) and as quality shorebird habitats decrease due to coastal development (Melville et al., 2016) and sea-level rise driven by climate change (Galbraith et al., 2002). To reduce the impacts of disturbance, managers and scientists in federal, state, provincial, municipal, and non-government organizations employ a variety of management techniques. Management techniques to reduce disturbance are used at sites across the United States and Canada portions of the Atlantic Flyway (Comber & Dayer, 2019a). Management is often focused at the site-level, but managers and scientists often share ideas with other sites through networks such as the Atlantic Flyway Shorebird Initiative.

**The Atlantic Flyway Shorebird Initiative is a collaborative conservation effort, involving numerous partners, with the goal of addressing shorebird declines at the Flyway scale. The Atlantic Flyway Shorebird Business Plan, published in 2015, identified key threats, as well as a suite of strategies and actions needed to conserve 15 focal shorebird species. AFSI and partners have been working to implement the recommended actions with the goal of increasing shorebird populations by 10-15% by 2025. Learn more about AFSI by visiting [atlanticflywayshorebirds.org](http://atlanticflywayshorebirds.org)**

**WHY FOCUS ON BEACH WALKING AND DOG WALKING?**

Although disturbance can result from a variety of human activities, this document focuses on beach walking and dog walking because a vast body of literature demonstrates that beach walking and dog walking can have numerous negative effects on shorebirds throughout the year. Specifically, beach walking can impact shorebirds by decreasing foraging rates (Burger & Gochfeld, 1991), initiating flight responses (Burger, 1986; Mayo & Paton, 2015), and reducing nesting success (Flemming et al., 1988). Similarly, the presence of dogs can evoke flight response (Burger, 1986), displace shorebirds from important foraging habitats (Burger, 1986), cause shorebirds to spend less time foraging (Burger & Gochfeld, 1991; Murchison, 2016), and can prompt temporary nest abandonment, leaving eggs subjected to thermal stress and exposed to natural avian and mammalian predators (Lord et al., 2001). In addition to indirectly affecting shorebirds, dogs can also directly impact them by preying upon chicks (Lafferty et al., 2006) and crushing eggs (Weston et al., 2012).

**DOCUMENT PURPOSE**

The purpose of this guidance document is to support land managers interested in applying scientific findings and human behavior change strategies to address two of the most widespread issues of human disturbance: general beachgoing and dogs on beaches. Further, it aims to introduce shorebird conservation professionals and land managers to Community Based Social Marketing as an approach to changing human behavior to benefit shorebird conservation.

**APPROACH**

This document employs a trans-disciplinary approach, in which insights from biological and social science fields are integrated, along with applied expertise and knowledge of land managers and conservation practitioners. Our approach also follows the best practices of science co-production whereby science producers work closely with science users throughout the scientific process. Our writing team included social scientists, shorebird biologists, and bird conservation professionals from Virginia Tech, Audubon, Manomet, Bird Studies Canada and US Fish and Wildlife Service.
This document is the culmination of two phases of a project in partnership with and partially funded by the National Fish and Wildlife Foundation. The project included: 1) a comprehensive literature review of shorebird disturbance; 2) biological and human activity data collected from November 2017—October 2018 across the U.S. and Canada portions of the Atlantic Flyway at 41 sites with a diversity of management regimes and ownership; 3) social science surveys of dog walkers at sites in Maine, New York, and South Carolina; 4) a comprehensive survey of 110 land managers at sites within the Important Bird Areas along the US and Canada portions of the Atlantic Flyway; 5) interviews with 27 land managers and biologists with experience in the development and implementation of zoning and closures for dogs on beaches in the US; 6) interviews and online surveys of beach walkers in the US portion of the Atlantic Flyway; 7) a pilot project to implement strategies to manage human disturbance at sites in Georgia; and 8) a four-part co-production workshop with participants from 12 states and provinces on the Atlantic Flyways from federal, state, local governments, and NGOs to synthesize insights from the various components of the project and recommend feasible strategies. The strategies - and associated social science to inform them - were based on a well-established approach to changing human behavior: Community Based Social Marketing. This document also serves as a resource to introduce conservation professionals to this approach and illustrate how it can be applied to address human disturbance of shorebirds.

Further, this document also builds on the previous Guidance and Best Practices for Evaluating and Managing Human Disturbances to Migrating Shorebirds on Coastal Lands in the Northeastern United States, a product of AFSI, written by Virginia Tech and US Fish and Wildlife Service that defines human disturbance, categorizes types of disturbance, reviews the associated literature, incorporates insights from land managers, and develops a protocol for monitoring disturbance. This document also builds on two other case studies of outreach and community based social marketing efforts conducted by Audubon South Carolina and Bird Studies Canada.
DATA-INFORMED MANAGEMENT NEEDS

The two phases of this project included rigorous social and biological data collection, a co-production workshop, and case studies on Atlantic Flyway beaches. Below we describe key insights related to shorebird human disturbance management, and we identify management needs along the Flyway based upon these components of the project. Links to the reports are also provided. These reports include many additional insights that may be useful for managing shorebird disturbance.

**ATLANTIC FLYWAY DISTURBANCE PROJECT: SOCIAL SCIENCE REPORT: PART I - LAND MANAGER SURVEY**

In 2018, we conducted a survey of 110 land managers along the U.S. and Canada portions of the Atlantic Flyway. Our findings pointed to several needs related to disturbance management. Specifically, restrictions related to potential disturbance activities were limited during the non-breeding season. Because disturbance impacts shorebirds during all portions of the annual cycle (e.g., Mengak et al., 2019; Lafferty, 2001b; Sabine et al., 2008), we revealed a need for increased management during the non-breeding season. Additionally, we found that unleashed dog walking was the most commonly restricted activity throughout the year, but leashed and unleashed dog walking had the lowest levels of public compliance. Because current efforts to manage dog-related disturbances are not always effective, there is a need for human behavior change approaches that go beyond simply providing information about the impacts of dogs on shorebirds. Lastly, managers reported needing more staff and volunteers to continue managing human disturbance.

**ATLANTIC FLYWAY DISTURBANCE PROJECT: SOCIAL SCIENCE REPORT: PART III – DOG ZONING AND REGULATION DEVELOPMENT**

To further examine managers’ needs related to dog disturbance, we conducted interviews with 27 managers and biologists from 11 states along the East Coast of the U.S. in 2020. We sought to understand site regulations pertaining to dogs (e.g., partial and full closures, zoning, leash laws), the process of developing, implementing, and enforcing regulations, as well as outcomes, lessons learned, and needs for future management. From the interviews, we learned that compromising with stakeholders is one method for limiting disturbance, reducing conflict, and ensuring public compliance. Compromise could be spatial (e.g., distinct zoned areas for dogs and shorebirds) or compromise could be temporal (e.g., allowing dogs on beaches during months when shorebird activity is minimal). Additionally, we learned that engaging stakeholders in the regulation development process can reduce public disapproval and conflict; therefore, it would be beneficial to include stakeholders in the regulation development process. Moreover, standardized regulations are favored over complicated, inconsistent regulations, so it could be beneficial for future signs or communication methods to use consistent messages that are straightforward and easy to understand. Furthermore, training law enforcement about the benefits of their presence and maintaining consistency in beach regulations could be beneficial for future efforts to reduce disturbance. Lastly, law enforcement presence is sometimes minimal due to other law enforcement priorities. Therefore, additional law enforcement is needed, or in the case where it is absent, alternative approaches to promote voluntary behavior change could be implemented, such as stewardship and outreach programs on the beach.
**ATLANTIC FLYWAY DISTURBANCE PROJECT: BIOLOGICAL DATA COLLECTION REPORT**

To assess the effects of human disturbance on six focal species (American Oystercatchers, Piping Plovers, Red Knots, Sanderling, Semipalmated Sandpipers, and Wilson’s Plovers) throughout the annual cycle, the Virginia Tech Shorebird Program (VTSP) developed a standardized protocol to collect data on potential disturbance types, shorebird distribution and abundance, shorebird behavior, breeding productivity, and management activities. Parts of the data collection protocol were based on previous disturbance work in the Bay of Fundy as part of the ‘Space to Roost’ project (Commission for Environmental Cooperation, 2016) and work conducted during fall migration at USFWS refuges (Mengak et al., 2019). VTSP worked with partners to collect data at 52 sites along the Atlantic Flyway that support breeding and non-breeding focal species, have different types and levels of human disturbance, and employ various human disturbance management techniques. VTSP and partners collected 10,523 point counts, 3,464 behavioral samples, and monitored 552 nests/broods from November 2017–October 2018 and March 2019–August 2020.

From the collected data, the VTSP found that certain shorebird species were less abundant at sites with a greater abundance of people and dogs, and at the sub-site or point-level, most shorebird species were less likely to be found near people or dogs conditioned on their current presence at the site. Additionally, shorebirds behaved differently in the presence of people and dogs; for example, shorebirds spent less time resting and more time alert when people and/or dogs were present. Critically, this study demonstrated that closures appeared to be effective at simultaneously reducing the amount of human activity and serving as areas of high shorebird use and were associated with greater numbers of shorebirds relative to sites with fewer site closures. These findings suggest that additional efforts to lessen disturbance frequency and intensity are needed such as expanding the use of closures, enhancing enforcement, and education and outreach efforts.

**CO-PRODUCTION WORKSHOP**

In December 2020, we conducted a co-production workshop with our human disturbance project team and 21 additional shorebird managers and biologists along the United States and Canada portions of the Atlantic Flyway. The workshop took place over Zoom through four half-day meetings in which participants had full group and small group discussions focused on 1) the biological and social science findings from phase 1 and phase 2 of the Atlantic Flyway Disturbance project; 2) the community-based social marketing approach and types of strategies that can be employed through CBSM; 3) case studies of three sites that either have used components of CBSM, are laying the groundwork to use CBSM, or have implemented a CBSM campaign; 4) co-production of CBSM strategies based on the presented biological and social data; and 5) next steps for implementing and monitoring the co-produced strategies.

Through group discussions, participants engaged in conversations that led to valuable insights about future research and management needs. Specifically, the discussions highlighted that **management is needed at important shorebird sites throughout the entire year**, rather than just during the breeding season and areas prone to high levels of disturbance from people and dogs. Moreover, **management efforts should focus on enhancing relationships with law enforcement** and increasing the use of “voluntary compliance” approaches such as using beach ambassadors to talk with people about issues associated with walking dogs near shorebirds. Lastly, the discussion emphasized the need for future research to better understand how disturbance affects shorebirds physiologically, the impacts of emerging disturbance types such as drones and kite surfing, and how site level disturbance can be quantified to show the impact of site-level disturbance on the population level.
COMMUNITY BASED SOCIAL MARKETING CASE STUDIES
CBSM and components of CBSM have been used to reduce human disturbances to shorebirds within the United States and Canada. In the section Case Studies, we outline three specific projects that have done so: Red Knot Ready, Space to Roost, and Wildlife Beach Zones. In these case studies, we summarize the conservation challenge that these projects worked to rectify, the project goals, strategies, outcomes/lessons learned and next steps.

SUMMARY OF MANAGEMENT NEEDS
The results from the biological and social science components of the Atlantic Flyway Disturbance Project, as well as the co-production workshop and case studies, suggest there are areas where management efforts can be enhanced to address shorebird disturbance. From the biological research, it is evident that additional efforts to lessen disturbance frequency and intensity from dog and human presence on the beach are needed at critical shorebird habitats used on a seasonal and daily basis. The land manager survey corroborated, showing the need for more management during the non-breeding season, and improved management for dog-related disturbance during all seasons. Specifically, managers and biologists at the co-production workshop noted that future management could be focused on areas where site ownership is vague due to dynamic environmental conditions (e.g., below high tide line) as well as sites with large populations of vacationers who may be unaware of local issues/regulations related to managing disturbance from dogs and beach walking. During the co-production workshop, managers also noted the need for more biological research on the physiological impacts of disturbance, the impacts of emerging disturbance activities (e.g., kitesurfing, drones), and the impacts of site-level disturbance on shorebirds populations.

The social science data indicated a need for continued management and/or community engagement related to beach walking because beach recreationists are generally not willing to walk the necessary distance needed to mitigate disturbances to shorebirds. In particular, according to expert opinion, dog walking was found to be the most widespread threat with the lowest rates of public compliance. The results from the regulation-focused interviews with managers indicated that low compliance is likely due to the lack of law enforcement at sites, often driven by competing priorities for their time. Through the interviews we found that some sites have had success with reducing disturbance by creating separate dog and wildlife zones as well as using voluntary compliance approaches, such as stewardship programs and outreach campaigns. Furthermore, the biological data showed that additional efforts to lessen disturbance frequency and intensity are needed. Therefore, creating dog and wildlife zones and using voluntary compliance approaches could be beneficial for sites that continue to face disturbance issues.

The Atlantic Flyway Disturbance Project: Social Science Report: Part III – Dog Zoning and Regulation Development outlines insights for creating zones based on the experiences of other managers. Both in the interviews and at the co-production workshop, managers noted that there is a need for further guidance on voluntary compliance approaches that can be used more widely across the Flyway. In this report, we outline strategies that can be used to encourage voluntary compliance through community-based social marketing (CBSM). Many management needs can be addressed using CBSM, and in this report, we bring together a list of resources that can be used to create CBSM campaigns. However, additional resources such as a web-based...
A toolkit is needed to assist managers in designing and implementing CBSM campaigns and a decision tree is needed to aid managers in deciding which strategies to focus on. Furthermore, there is a need for more pilot testing and evaluation of campaign efficacy. This testing is particularly beneficial when it follows our standardized protocol and when there is data before a campaign is implemented, as well as from control and intervention sites. Lastly, there is a need for a community of practice of conservation professionals who can support each other through the CBSM process and track and report on their experiences for future CBSM implementers to learn from.

In an effort to help sites across the Flyway implement similar campaigns, this document outlines an approach called community-based social marketing (CBSM), which aims to encourage voluntary compliance. It then details next steps on a Flyway-scale for implementation and monitoring.

In an effort to help sites across the Flyway implement similar campaigns, this **document outlines an approach called community-based social marketing (CBSM), which aims to encourage voluntary compliance.** It then details next steps on a Flyway-scale for implementation and monitoring.
COMMUNITY BASED SOCIAL MARKETING

WHAT IS COMMUNITY-BASED SOCIAL MARKETING?

CBSM uses psychology and marketing techniques to encourage people to change their behavior. CBSM focuses on working at the community-level to promote engaging in a behavior by removing barriers/constraints to the behavior and increasing benefits of the behavior. CBSM has been used in a range of fields such as agriculture, conservation, energy, transportation, waste reduction, pollution, water efficiency, and watershed protection (McKenzie-Mohr, 2011). The CBSM approach consists of five steps: (1) select a behavior to promote; (2) identify perceived barriers/constraints and benefits to the behavior; (3) develop a strategy to reduce perceived barriers/constraints and increase benefits; (4) pilot the strategy; and (5) implement and evaluate the strategy (McKenzie-Mohr, 2011).

Encouraging beach recreationists to engage in pro-conservation behaviors, such as leashing dogs, can reduce disturbances to shorebirds. Sign photo, Scott Kruitbosch; dog on leash, Will Richards; wildlife viewing, NJ Audubon
A CBSM PRIMER FOR SHOREBIRD DISTURBANCE

The CBSM approach was developed by Doug McKenzie-Mohr. In the book *Fostering Sustainable Behavior*, McKenzie-Mohr outlines the CBSM process and provides guidance on how to implement CBSM campaigns. In this section, we adapted information from *Fostering Sustainable Behavior* to provide insights about CBSM in the context of shorebird conservation.

Step 1: Select a behavior to promote

If there is a behavior that you would like to change, you need to start by asking yourself, *what behaviors can I promote instead?* In community-based social marketing, there are a few guidelines for selecting behaviors to promote. We suggest that managers make a list of potential behaviors to promote by using the guidelines below.

1) Choose a behavior that is non-divisible – This means that the behavior cannot be broken into additional behaviors. A non-divisible behavior provides clear, direct guidance on what beach recreationists should do. An example of a non-divisible behavior is “leash dogs near shorebirds.” With this statement, there is no confusion about how to do the desired behavior. On the other hand, when calling for a behavior such as “share the shore,” beach recreationists might be left wondering “how do I share the shore?” If such a slogan is used, CBSM would call for pairing it with a clear call to a specific behavior. Otherwise, the vague call to action could prevent the desired behavior from being achieved.

2) Choose a behavior that has a clear-end state – A behavior with a clear-end state means that the behavior promoted is the behavior that will achieve the goal. For example, if your goal is to get dog walkers to leash dogs, and you promote “Purchase a leash,” you are not achieving the goal because your goal is not to “purchase” a leash but rather to “use” a leash. Behaviors that do not have clear end states can leave beach recreationists with additional steps that need to be taken. To determine if you have an end-state behavior, ask yourself if there are any other steps that would need to be taken to achieve the desired behavior. If there are other steps, then the behavior is not end-state. If there are no other steps involved in achieving the goal, then the behavior is end state.

3) Choose a behavior that is positively framed – When promoting a behavior, it is best to avoid using words that have negative associations such as “keep away, keep out, stay away, do not, no trespassing, etc.” Instead, we suggest using words that are positively framed or provide suggestions for behaviors that people can do rather than behaviors people cannot do.

Once you make a list of potential behaviors to promote, you should evaluate the following three characteristics for each behavior.

1. Impact – The degree to which the behavior will make a difference
2. **Probability** – The likelihood that the behavior will be adopted by your target audience

3. **Penetration** – The degree to which the behavior is already done by the target audience.

**Determine Impact:** There are two approaches to determine impact on the environmental resource, in this case shorebirds. 1) Collect information about the impact of the behavior. For example, behavioral observations of shorebirds (i.e., feeding rates or time spent alert, roosting, foraging, or nesting) when the target audience engages in the desired behavior versus when the target audience does not engage in the desired behavior. Alternatively, you could 2) survey people with expert knowledge about the behavior and its potential impact. The latter approach might be more feasible or cost effective, but may not be as accurate.

**Determine probability:** You can examine the probability of success by assessing the outcomes of past programs that tried to encourage people to undertake your target behavior. If the behavior has never been promoted, you can survey the target audience to assess the probability that they would engage in the targeted behavior if encouraged to do so. Or, you could also survey experts with experience working with the target audience and ask their opinion on whether it is feasible to get people to change to the target behavior.

**Determine penetration:** The percent of people who engage in the desired behavior currently can be determined by observing the target audience or by surveying the target audience about the frequency that they engage in the target behavior.

Identifying the impact, probability, and penetration of each behavior, will help you determine which behavior is likely to have the greatest level of success in a CBSM campaign. After collecting the impact, probability, and penetration of potential behaviors, calculate a mean composite score of each behavior. For penetration, you should use the inverse of the calculated penetration since the inverse represents the extent that the behavior is not being done, and thus the potential for gaining new engagement in the behavior. Inverse penetration can be calculated by subtracting the penetration from 100. For example, if 30% of people already leash their dogs at the beach, the inverse penetration that you would use to calculate the mean score would be 70%.

**Step 2: Identify perceived barriers/constraints and benefits to the behavior**

CBSM is based on the premise that there are barriers (i.e., physical impediments) and constraints (i.e., perceived issues) that prevent people from engaging in a desired behavior. There are also
benefits or advantages that people receive from engaging in the behavior. In order to promote a desired behavior, benefits, barriers, and constraints pertaining to the behavior need to be uncovered. To understand these factors, managers should conduct observational studies, focus groups, and/or interviews of beach recreationists. To conduct these studies, managers should collaborate with a social scientist because when researchers lack social science knowledge and training, important theoretical frameworks can be overlooked, studies can be poorly designed, or methods can be flawed (Martin, 2019). Once you consult with a social scientist, you can carry out observational studies, focus groups, and/or interviews and use insights from those studies to create a survey. The purpose of the survey is to understand the benefits, barriers, and constraints of engaging in a desired behavior on a larger scale. For designing a survey that is well-constructed and meets ethical standards, managers or scientists should use the following resources:


Before you conduct interviews, focus groups, or surveys, it is important to note that some agencies and organizations require that research on human subjects be reviewed and monitored by an institutional review board (IRB) or other types of review. For more information on institutional review boards, go to [https://www.fda.gov/regulatory-information/search-fda-guidance-documents/institutional-review-boards-frequently-asked-questions](https://www.fda.gov/regulatory-information/search-fda-guidance-documents/institutional-review-boards-frequently-asked-questions).

**Step 3: Develop strategies to reduce barriers/constraints and increase benefits**

After uncovering the benefits, barriers, and constraints to the desired behavior, the next step is to use strategies grounded in social science to simultaneously reduce the barriers and constraints and increase the benefits. Strategies can be used either independently or together. Strategies for changing behavior include the following: social norms (i.e., encouraging people to act in a way that is consistent with their perceptions of other people’s expectations), commitment (i.e., asking people to agree to do an action in the future), prompts (i.e., reminding people to practice a behavior), incentives (i.e., providing a form of compensation for practicing a behavior), social diffusion (i.e., using trusted sources to encourage a behavior), convenience (i.e., making it easy to do a behavior), and communication (i.e., sharing information about a behavior in an interpretive manner) (McKenzie-Mohr, 2011).

*It’s important to understand the barriers people have to the behavior you are trying to change.* loveninja, Pixaby
**Step 4: Pilot test strategies**

Before implementing strategies, you should collect baseline data on the behavior that you are seeking to change (unless you’ve already done so in a previous step) so you can later measure the impact of the strategies after you implement them. After collecting the baseline data, you can “pilot test” the strategy on a small scale. Small-scale pilot testing can allow you to identify and address any issues that may arise before you implement the campaign broadly throughout the community. During the pilot testing process, you should plan to use a different test group from the group of people who were involved in the benefits, barriers, and constraints study (step 2). You should also plan to pilot test your strategy on at least two groups of people, and you should also use random assignment to place people in these groups. Lastly, you should measure behavior change by examining the perceptions and attitudes of the participants but be careful not to solely rely on people’s perceptions as they can sometimes be unreliable. Instead, you should seek to examine actual changes in behavior and compare that to your baseline data.

**Step 5: Broad-scale Implementation and Evaluation**

If the pilot test suggests that the strategy can be conducted in a cost-effective manner, the strategy can be implemented broadly throughout the community. After you implement the strategy, be sure to collect data on the behavior that you are seeking to change so you can compare it to the pre-campaign data and measure if the campaign had an impact. Sometimes, the impact of a campaign may not be apparent immediately. You should collect data at various time intervals and over a period of time to make sure you capture long-term impact. Based on your findings, you can re-evaluate your campaign strategy and adapt it as needed to meet your goals.

*Virginia Tech researchers using a survey to evaluate the effectiveness of a pledge campaign conducted by Audubon New York. Ashley Dayer.*
The ultimate goal of any program is to protect shorebirds so they can easily rest, fuel, raise their young. Ray Hennessy, rayhennessy.com
COMMUNITY BASED SOCIAL MARKETING CASE STUDIES

Here we present case studies of projects that have used the CBSM approach or have used components of CBSM to encourage behavior change at sites in the United States and Canada. These case studies serve as examples of different types of CBSM projects related to shorebird conservation. Below, we summarize the conservation challenge that these projects worked to rectify, the project goals, strategies, outcomes/lessons learned and next steps.

RED KNOT READY
South Carolina, USA
2019-2020

Context
Organization/Agency
Nolan Schillerstrom led the Red Knot Ready campaign. The campaign was created in collaboration with Blue Ion Outpost, College of Charleston, Audubon South Carolina, and the birding community of Knotty Beach called Knotty Beach Birders. The pseudonym ‘Knotty Beach’ will be used as per IRB protocol in order to protect the identities of survey participants.

Location
Knotty Beach = the northern tip of a beach “North Beach” on the south side of Captain Sam’s Inlet

Social/Political Context
Knotty Beach is part of a private barrier island that is attached to the mainland by a drivable bridge. The portion of the beach that Red Knots typically used was the north end of the island that was recently renourished with sand in 2015. The renourishment created approximately 52 acres of designated critical habitat for shorebirds that is legally off-limits to dogs on or off leash but people are allowed to access. This area consists of a main beach with an eyelet pond and multiple sandbars that become exposed and connect to the main beach at low tide. The entire island is a private community where most of the population is middle to upper class with a median household income of $106,058 and 2018 median property value of $639,500 according to the U.S. Census Bureau (2018). This island has full-time residents, part-time residents, and short-term vacation renters that use the beach. The human population of the island is approximately 1,694 people and varies based on the season (U.S. Census Bureau, 2018). To get on the island, one must either be a verified renter, a homeowner, or a guest of a homeowner.

Shorebird Species
The campaign focused on Red Knot, but other species that benefited included Piping Plover, Least Tern, Wilson’s Plovers, Black Skimmers, Brown Pelican, American Oystercatchers, and any other bird that rested on the beach.

Conservation Challenge
Even with the designated critical area, additional management was needed to decrease human disturbance to the large flocks of resting and feeding Red Knot. In 2015, a sand renourishment project created approximately 52 acres of designated year-round critical habitat for shorebirds. The area, which is commonly used by Red Knot, is legally off-limits to leashed and unleashed dogs but people are still allowed to access the area. The Red Knot Ready campaign was meant to minimize the amount of disturbance from people that still accessed the site.

Goals
The goal of this project was to make walking around shorebird flocks the norm among local residents and island-visitors. We sought to achieve this through research-based messaging rooted in social diffusion theory because beachgoer surveys and resident interviews pointed to social diffusion as a method that was likely to change beachgoer behaviors near flocks of Red Knot and other migratory beach bird flocks.
Strategy/Solution
We created a social marketing campaign called “Red Knot Ready” to change beachgoer behavior and perceptions on Knotty Beach. To begin the campaign, we conducted an observational study and intercept surveys with beach recreationists to refine who our target audience was and develop core messages to influence that audience. Next, we used Facebook and Instagram as the main channels for communicating with our target audience. The hashtag #FlockWalk was used on social media to help spread messages related to walking around shorebird flocks. We also created a website (http://www.RedKnotReady.com), which could be accessed through social media posts. The website served as a place for our audience to learn more walking around shorebird flocks and also gave the campaign legitimacy. A key feature on the website was our campaign mascot, “Momma Red Knot.” This iconic symbol was created using fivver.com (a marketplace for freelance services) and the name “Momma Red Knot” was developed based on research, which shows that attaching terms of kinship to wildlife species names may promote willingness to contribute to conservation-related causes (Qirko, 2017). Momma Red Knot serves as the campaign symbol and is also a creative way to share core messages such as “walk around the flock.” Red Knot Ready and its various messages can still be found on social media at @mommaredknot on Instagram and Facebook.

Program Outcome
The research study associated with the Red Knot Ready campaign aimed to evaluate the current state of shorebird conservation efforts on Knotty Beach, implement a social marketing campaign, and evaluate the implementation and effectiveness of the campaign. Data was collected across two years (2019-2020) in order to compare results before and after the implementation of Red Knot Ready. Due to COVID-19, the second year of data collection was cut-short. Only 2019 data was analyzed as part of the study. However, a communications campaign was still created and implemented as a result of the first year’s data collection. The entire campaign operated with less than $100, so social media was the primary delivery for content. However, local news television and the local paper were identified as ideal channels for communicating the Red Knot Ready message with the target audience.

Next Steps
If more funding were available in the future for this campaign, it would be beneficial to reach the target audience through paid advertisements on TV and in the local newspaper.
COMMUNITY BASED SOCIAL MARKETING CASE STUDIES

SPACE TO ROOST
Nova Scotia, Canada
2016 - 2020

Context
Organization/Agencies
Birds Canada, a national non-profit organization, currently leads the Space to Roost program. The Space to Roost program was created in collaboration with Birds Canada, the Nova Scotia provincial government, with support from Dalhousie University, the Blomidon Naturalist Society, and other local stakeholders.

Location
Avonport and the Guzzle are located in the Minas Basin, Bay of Fundy, near Wolfville, Nova Scotia.

The nearest population centre, Wolfville, has a year-round population of 4,195 but students at Acadia University almost double the population during the school year. Wolfville is less than an hour drive from Halifax, which is Atlantic Canada’s largest city, so Wolfville is considered an attractive tourist destination.

Shorebird Species
Avonport and the Guzzle support migratory shorebirds on their southbound migration such as semipalmated sandpipers, semipalmated plovers, sanderlings, white-rumped sandpiper, least sandpiper, yellow legs, and black-bellied plovers.

Conservation Challenge
The Bay of Fundy, including the Minas Basin, experiences some of the highest tides in the world. At low tide, there are extensive mudflats that provide excellent feeding and roosting habitat for shorebirds. These beaches are also popular recreational sites for beachgoers, swimmers, walkers, photographers, and anglers. At high tide, the size of the beach is greatly reduced, causing shorebirds and people to compete for the limited remaining space.

Goals
The goal of this project was to reduce human disturbance to roosting migratory shorebirds by raising awareness about the importance of Avonport and the Guzzle for shorebirds. By increasing awareness about the role that these sites played in shorebird conservation, we hoped that tourists and locals might choose to recreate on alternative beaches, which would leave these sites free from human disturbances so shorebirds could safely roost at high tide.

Strategy/Solution
During peak migration (August), Shorebird Resting Beaches (SRB) are created for roosting birds. SRB are locations where voluntary beach closures occur for two hours before and after high tide. Because Birds Canada has no authority to prevent access to the site, the closures are voluntary.
To inform beach recreationists about voluntary closures, signs are set up at the edge of the parking lot and immediately before accessing the beach. The signs include details about the importance of the site, what the SRB is trying to accomplish, and the times that people should avoid using the beach. Handouts with similar information, including tide times, are available at the site and are handed out at local tourist hot spots such as cafes, tourist information centers, historical sites, and campgrounds. Throughout the month, a Birds Canada staff member or intern visits the site to conduct point counts, measure human and bird use, record disturbance events, and conduct on-site interpretation with the public.

**Program Outcomes**
The campaign resulted in a decrease in the number of human disturbance incidents at the Guzzle and Avonport. Prior to implementing the SRB, 85 beach users and 17 disturbance events were recorded at the Guzzle and Avonport. But after the SRB was implemented, there was an increase in beach users, up to 152 and 292 respectively near the SRB, but disturbance incidents decreased to 7 and 8 respectively. Taking the time to collect baseline shorebird presence data, disturbance data, and beachgoer survey data prior to implementing the SRB was key to the success of this program. Because we took the time to interview anglers about the likelihood that they would comply with an intervention such as the SRB, and because we collaborated with local stakeholders and project partners, we knew prior to implementation that the SRB would likely be successful. After implementation, we saw an increase in public interest at the site, specifically...
among bird watchers. This area has become well-known amongst the birding community because the dyke walls are elevated above the SRB, making it a great location for birding. The presence of bird watchers acts as a deterrent for people going onto the SRB because, in order to go onto the SRB, beachgoers have to walk in front of a line of bird watchers with cameras and spotting scopes. Therefore, it is likely that the SRB is being respected even when program staff are not on site.

**Lessons Learned**
Collecting baseline data on bird presence, disturbance events, and beachgoer attitudes prior to implementing the SRB was integral for measuring the success of this project. Despite the ongoing success, we noticed a change in beach user groups and disturbance issues over the years. Anglers were the predominant user group and the primary source of disturbance, but now, disturbance from photographers, low flying helicopters, and small airplanes are a growing cause of disturbance. This means that future messaging and outreach needs to be adjusted accordingly to address the changing disturbance types and user groups.

**Program Adjustments Due to COVID-19**
Nova Scotia and the rest of Atlantic Canada had low COVID numbers. Together, the provinces created the “Atlantic Bubble,” which allowed unrestricted travel throughout Atlantic Canada (NS, NB, PEI, NFLD) and required anyone visiting from outside the bubble to quarantine for two weeks. This enabled our field season to proceed normally; however, we are taking precautions in case the situation is different in the future. We feel having informational handouts in a box on-site is no longer safe and could become a possible transmission site so we are reevaluating our approach so we can improve the Space to Roost project for the future.

**Next Steps**
This year we are planning to update our signs with less text and more graphics to make them more visually appealing. We will continue making the handouts available at key tourist hotspots but we will also mail handouts to residences near the beaches to make sure that we are targeting local beachgoers. Our hope is that it will reinvigorate interest and commitment to the SRB. Beyond 2020, we hope to increase volunteer capacity so we can increase data collection and stewardship at more sites within the Bay of Fundy.

**Additional Notes**
Jaya Fahey, former Birds Canada employee and Dalhousie University graduate, spearheaded the creation of the Space to Roost program along with Sue Abbott (formerly Birds Canada). Jaya’s thesis, which focuses on the Space to Roos program is available at: https://dalspace.library.dal.ca/handle/10222/79200

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**Avoid disturbing flocks during shorebird resting times**

| August 1 | 06:43 – 10:43 | 19:08 – 23:08 |
| August 3 | 08:28 – 12:28 | 20:34 – 24:34 |
| August 5 | 10:12 – 14:12 | 22:20 – 26:20 |
| August 7 | 11:56 – 15:56 | 1:06 – 15:06 |
| August 9 | 13:40 – 17:40 | 3:50 – 17:50 |

Tide charts prompting beach recreationists to avoid “Shorebird Resting Beaches” during low tide, when the shorebirds use the beach to forage. Laura Bartlett
COMMUNITY BASED SOCIAL MARKETING CASE STUDIES

WILDLIFE BEACH ZONES
Georgia, USA
August 2018-August 2020

Context
Organization/Agency
Manomet, a non-profit organization, currently leads the first case study for the larger Atlantic Flyway Disturbance project, applying recommendations from and working with partners at National Audubon Society, the Virginia Tech Shorebird Program, and the Dayer Human Dimensions Lab at Virginia Tech.

Location
This project focuses on four sites with a spectrum of human and dog recreational disturbance levels, as well as range of management and ownership. The focal sites are 1) Island Site One, a beach with dog restrictions but heavy recreational use, 2) Island Site Two, a National Monument with low but impactful numbers of people and both leashed and unleashed dogs, 3) Island Site Three, a busy public beach with heavy recreational use by both people and their dogs, and 4) Island Site Four, which has dog exclusion zones, leash requirements and enforcement, and heavy recreational use. The focal sites for this project are managed by municipal governments, the National Park Service, island governing agencies and the state.

Social/Political Context
The study areas chosen are the four main locations with publicly available beach recreation along the Georgia coast. Both of the northern focal sites are used by visitors and residents of Savannah, and the two sites to the south are also popular tourist destinations. In 2019, Island Site Two recorded 374,290 recreational visitors (NPS Stats web portal). Island Site One hosted over 1,000,000 visitors in 2015 (Armstrong, 2015), while in 2018 the region that includes Island Sites Three and Four had over 3.2 million visitors (GICVB). In 2017, the total resident population of Island Site Three was 883, and consisted of permanent homes, secondary homes and rentals. The average household income was $71,238 (US Census, 2019). Island Site Four has approximately 14,778 residents, with a median household income of $87,248 (US Census, 2019). Island Site One has a population of 3,093 people with a median income of $65,150 (US Census, 2019).

Shorebird Species
These sites currently or have recently served as roosting or nesting habitat for American Oystercatcher and Wilson’s Plover, and feeding...
or roosting habitat for Piping Plover, Whimbrel and Red Knot.

**Conservation Challenge**
The four project locations provide a wide range of uses for shorebirds. For example, Island Site Two is an important roosting site for shorebirds, including wintering groups of American Oystercatcher and staging Whimbrel. The site also serves as spawning habitat for horseshoe crabs, whose eggs fuel hundreds of migrating shorebirds. Island Site One hosts wintering Piping Plovers, and occasionally, nesting American Oystercatchers and Black Skimmers. Island Site Three supports large numbers of shorebirds throughout the year, including wintering Piping Plovers, migrating Arctic-nesting shorebirds and nesting Wilson’s Plovers. Island Site Four also serves as an important nesting site for Wilson’s Plovers, and additionally, hosts one of the largest colonies of nesting Least Terns in the state. Disturbances at these sites are primarily the result of beach recreationists who are walking, running, sunbathing or swimming. Off-leash dogs are an issue at three of the four sites, with the exception of one, where dogs are currently not permitted.

**Goals**
The goal of this project was to 1) create standard messaging for “Wildlife Beach Zones,” which are sections of public access beaches that are most significant for shorebirds and other wildlife year-round and 2) use CBSM to encourage “behavioral asks” that will address the most significant issues within these zones at each site. One key element to this strategy is incorporating flexibility to tailor the desired behavioral change, based on the threats and opportunities, at each site. Specifically, at Island Site Two, we sought to highlight the importance of the shoreline and build a seasonal use restriction plan. On Island Site One and Three,

[this good dog is always leashed up when he goes to the beach. Abby Sterling] we sought to implement a Wildlife Beach Zone and encourage recreationalists to avoid walking above the tideline. On Island Site Four, we planned to encourage beach-users to leash their dogs within the Wildlife Beach Zone at a critical section of beach.

**Strategy/Solution**
We implemented the Atlantic Flyway Disturbance Project Data Collection Protocols to survey beaches prior to identifying Wildlife Beach Zones. We also used the results from those surveys to determine the areas where shorebird-use and beach-users overlap significantly. We then designed strategic plans to engage communities and site managers to protect each zone based on opportunities and threats at each site. This included plans to roll out a beach user survey in collaboration with Virginia Tech’s Dayer Human Dimension Lab, targeting dog walkers on Island Site Four. Unfortunately, our implementation plans were targeted to begin in the spring of 2020, and were disrupted by the global novel coronavirus pandemic (COVID-19). During this time, we shifted from community engagement, and applying the tenets of community based social marketing, to engaging with managers at these sites to ensure successful implementation of Wildlife Beach Zones.
COMMUNITY BASED SOCIAL MARKETING CASE STUDIES

Since each site is under unique ownership and management, we worked individually with each site owner/manager. We hosted a virtual webinar to highlight the importance of these sites and the critical role they serve for shorebirds. We presented site specific information about threats and opportunities for wildlife protection to managers at each location and stressed the flexibility within the zone designations to target specific behaviors at each site, prioritizing manager’s goals as well. We also highlighted to site managers the importance of broad state-wide messaging consistency to encourage their support of the program. We received support from managers at Island Site Two after sharing preliminary biological survey data. Understanding the ecological significance of their shoreline increased cooperation and enthusiasm for protecting habitat for shorebirds. We presented data and recommendations to Island managers at Site One including the Mayor and the community beach task force, which resulted in support for the idea. We continued to work with the GA Department of Natural Resources to outline plans for designating a section of beach as a Wildlife Beach Zone at Site Four, and used remote and socially distanced techniques to educate beach users about critical habitat. These included signs, rope lines, and social media posts. To engage with decision makers at Island Site Three, we created a marketing pitch about rebranding the critical habitat on the island’s southern portion of the beach as a Wildlife Beach Zone.

Program Outcomes
Despite having these strategies severely disrupted by the pandemic, we accomplished goals and learned transferable lessons that we feel are important for the success of any disturbance reduction strategy. First, while community support is important, it is critical to simultaneously create buy-in from site managers and decision makers. Early in planning meetings, we received almost universal buy-in from site partners, but we found that early buy-in does not necessarily translate to implementation. Therefore, it is important to plan for delays and logistic challenges in implementation. For example, when working at Island Site Three, despite positive feedback from managers, we needed to get buy-in from the marketing team and other decision makers in order to move forward.

We found a great deal of success in creating a strategy with broad consistency in messaging, but with site-specific asks that would result in desired behavior changes. This allowed us to capitalize on opportunities and address threats directly. For example, when working at Island Site Four, despite positive feedback managers, we needed to get buy-in from the marketing team and other decision makers in order to move forward.

Ft Pulaski is a high tide roost based on the biological surveys so stewarding is a focus there during high tide. Abby Sterling
COMMUNITY BASED SOCIAL MARKETING CASE STUDIES

Another important lesson learned was that it can be helpful to frame strategies based on the audience. For example, resource managers at Island Site Two were swayed by the data collected during our pre-implementation surveys that showed how important the shoreline was for shorebirds. But, to move forward with implementing Wildlife Beach Zones on Island Site Three, we needed to translate our proposal and our science into a marketing pitch to highlight how zoning could benefit Jekyll Island’s image and appeal as a tourism destination. Interestingly, these concepts of understanding the benefits and constraints for your audience are principal tenets to community based social marketing.

It was also critical to our success to use existing resources to implement strategies and to build on existing programs, especially given constraints due to COVID-19. On Island Site Four we used previously engaged volunteers to maintain symbolic fencing around nesting birds. Due to the pandemic, we were unable to implement the education and outreach campaign that we originally planned. However, volunteers ensured that barriers were in place, and even informally chatted with beach users at a distance, ensuring that the nesting season was a success. Another example of building on existing programs is the framing of our zones of protection as Wildlife Beach Zones, rather than having a narrower focus on only shorebirds. This strategy allows us to capitalize on the existing norms and enthusiasm for protecting other charismatic coastal species - including sea turtles. In this way, we can use some of the same networks and resources, and work together more broadly to protect habitat that benefits numerous species.

Finally, maintaining flexibility has been instrumental in implementing these strategies. In addition to challenges posed by the pandemic, there has been momentum and changes at all of these sites over the course of the project. For example, at Island Site Two, managers closed the shoreline due to the pandemic, but then kept the shoreline closed even after the park opened again. During these closures, we were able to continue our surveys and document shorebirds using the entire shoreline rather than the extreme east end where they had congregated prior to the closure. While there were several reasons that the park moved to restrict access, including unsafe conditions due to shoreline erosion and ship wakes, protecting the shoreline for shorebirds was also a reason. From the perspective of protecting habitat, we have achieved significant gains, but are limited in our ability to highlight that zoning is a beneficial way to balance recreational and wildlife needs. Moving forward, we will work with the park to build an outreach stewardship program to build support for protecting the shoreline as valuable habitat, and highlight the value of the site for observing shorebirds from a distance.

Next Steps
We have secured tentative agreements at all sites to implement Wildlife Beach Zones, which will include ~10 acres on Island Site One, ~10 acres at Island Site Two, ~45 acres on Island Site Three Island, and ~45 acres on Island Site Four. As limitations due to the pandemic ease, we will move forward with implementing community based social marketing strategies to reduce off-leashed dogs on Island Site Three, encourage people to stay below the tideline on Island Site One, and raise awareness coast-wide for the value of certain areas of publicly accessible beaches as critical habitat for shorebirds and other wildlife. This will include community engagement, events, creating prompts, and eventually shifting social norms and building regional pride for the incredible beach habitats that can be found on the Georgia coast.
FOCUS ON DOG WALKING AND BEACH WALKING IN A CBSM CAMPAIGN

In 2018, we began the process of designing a CBSM campaign aimed at reducing human disturbances to shorebirds. To determine the most appropriate behavior to promote, we conducted an online survey with 110 land managers and biologists who are intimately familiar with shorebird management in the United States and Canada portions of the Atlantic Flyway (for more information on this survey see Data-informed needs related to disturbance along the Flyway). In the survey, we asked managers about their opinions on the impact, probability, and penetration of potential conservation behaviors (Table 1) that beach recreationists could take to voluntarily decrease human disturbance impacts to shorebirds. Through the survey, managers reported the following three behaviors as having the greatest potential impact at reducing disturbances to shorebirds: walking or running around a flock of shorebirds rather than through them, leashing dogs on the beach, and riding bikes around shorebirds. Managers also rated the probability that people would engage in potential shorebird conservation behaviors and noted that people were most likely to walk or run around shorebird flocks rather than through them, fill in holes dug in the sand, and leash dogs on the beach. Lastly managers rated the penetration or degree to which these behaviors are already completed. If a behavior has high penetration, then there is little to gain by promoting it, so the inverse of the penetration was calculated to see which behaviors would have the greatest gain if promoted. From the inverse penetration, we found that driving with a spotter, using boat ramps, and walking or running around a flock of shorebirds were the top three behaviors with the greatest inverse penetration. After assessing the impact, probability, and inverse penetration, we averaged these values for each conservation behavior. Based on the mean score, the resulting top three behaviors that we found to be the most appropriate for a CBSM campaign were walking or running around a flock of shorebird; leashing dogs on the beach; and riding bikes around shorebird flocks.

Table 1. Summary of land managers’ opinions of potential behaviors to promote through community-based social marketing. To determine the most appropriate behavior to promote through CBSM, impact, probability, and inverse penetration were analyzed through an online survey to land managers. The behavior with the highest mean composite of these characteristics is the behavior best suited for CBSM.

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Impact</th>
<th>Probability</th>
<th>Inverse Penetration</th>
<th>Mean Composite</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walking or running around shorebirds</td>
<td>70.3</td>
<td>63.5</td>
<td>84.3</td>
<td>72.7</td>
</tr>
<tr>
<td>Leashing dogs on the beach</td>
<td>64.2</td>
<td>52.8</td>
<td>82.6</td>
<td>66.5</td>
</tr>
<tr>
<td>Riding bikes around shorebirds</td>
<td>47.6</td>
<td>52.3</td>
<td>89.8</td>
<td>63.2</td>
</tr>
<tr>
<td>Filling in holes dug in the sand</td>
<td>29.2</td>
<td>57.1</td>
<td>90.6</td>
<td>59.0</td>
</tr>
<tr>
<td>Lowering vehicle speed</td>
<td>25.2</td>
<td>46.9</td>
<td>83.7</td>
<td>51.9</td>
</tr>
<tr>
<td>Driving on the wet sand</td>
<td>21.9</td>
<td>51.0</td>
<td>81.3</td>
<td>51.4</td>
</tr>
<tr>
<td>Lowering boat speed</td>
<td>38.3</td>
<td>25.3</td>
<td>80.7</td>
<td>48.1</td>
</tr>
<tr>
<td>Driving on the soft sand</td>
<td>20.4</td>
<td>42.5</td>
<td>70.5</td>
<td>44.5</td>
</tr>
<tr>
<td>Filling in tire ruts</td>
<td>19.5</td>
<td>14.3</td>
<td>97.8</td>
<td>43.9</td>
</tr>
<tr>
<td>Using boat ramps</td>
<td>18.6</td>
<td>57.1</td>
<td>39.5</td>
<td>38.4</td>
</tr>
<tr>
<td>Driving with a spotter</td>
<td>17.8</td>
<td>0.00</td>
<td>97.2</td>
<td>38.3</td>
</tr>
</tbody>
</table>

Impact is the percent of land managers who feel that the behavior will minimize human disturbances to shorebirds.

Probability measures the percent of land managers who feel that beach recreationists could be encouraged to do the behaviors.

Penetration is the percent of land managers who feel that the behaviors are already being done by beach recreationists. The inverted values are shown above (100-penetration value) to account for the percent of land managers who do not feel that the behaviors are already being done by beach recreationists.

Mean composite is the average of impact, probability, and inverse penetration.
To understand what prevents beach recreationists from leashing dogs on beaches and to understand what benefits they receive from taking this action, we reviewed relevant literature, observed beach recreationists engaging in dog walking on beaches, and conducted interviews with dog walkers. Using this information, we created a survey to assess the barriers, constraints, and benefits of voluntarily leashing dogs at sites across the Atlantic Flyway. We administered the survey from July through October 2018 to 890 beach recreationists with experience walking dogs at beaches in Maine, New York, and South Carolina. We compared the responses of beach recreationists who were walking dog(s) off leash (n = 563) to those who were walking their dog(s) on leash (n = 498). Common perceived constraints to leashing included perceptions about reduced socialization for dogs, reduced exercise for dogs, and a disbelief that there is a need to leash because dogs listen to owners’ commands. Common perceived benefits to leashing included preventing dogs from running into areas for beach-nesting birds, increased safety for dogs, increased control by dog walkers, and keeping dogs away from other people. Additionally, we found that most dog walkers believe dog walking should be controlled for the protection of shorebirds and would feel bad if they walked their dogs near nesting shorebirds. Yet, dog walkers do not tend to believe that their dogs would be a threat to shorebirds. More information on benefits and constraints to leashing dogs near shorebirds can be found at:


BENEFITS AND CONSTRAINTS TO VOLUNTARILY WALKING AROUND SHOREBIRD FLOCKS

Through the CBSM selection process, we also found that walking or running around shorebird flocks was a behavior that would be well-suited for a CBSM campaign, so to promote this behavior, we started by understanding the benefits and constraints. In May 2020, we recruited 27 participants who had experience walking on Atlantic Coast beaches. We recruited participants on Facebook using 16 public community groups associated with coastal areas or beach communities on the Atlantic Coast. Through interviews with these participants, we gained insights about possible benefits and constraints to walking around flocks and used that information to create a survey to administer to a larger group of beach recreationists. Due to restrictions relating to COVID-19, we could not conduct in person surveys of beach recreationists, so we purchased a survey panel from Qualtrics. The panel consisted of 1,046 beach walkers with experience walking on East Coast beaches in the last 12 months. Qualtrics distributed the survey that we created to the participants within their system and provided us with the data. We analyzed the data by separating the participants into two groups: those who intended to walk around shorebird flocks (n = 876) and those who did not intend to walk around shorebird flocks (n = 170).

Beach goers reported that the benefits to walking around shorebird flocks were related to beach users themselves and also to shorebirds. For example, some benefits to shorebirds included reduced disturbance while shorebirds feed, nest, and rest. Benefits to people included personal satisfaction to know they were not the cause of disturbance to shorebirds, being able to watch shorebirds in their natural state, avoiding bird aggression, and avoiding being defecated on. Beach recreationists also reported that constraints related to the physical environment and space limitations within beach settings. Furthermore, we found that constraints related to personal factors such as beach recreationists’ attitudes, knowledge, and skills. In addition to learning about benefits and constraints, we also found that beach recreationists felt neutral about personal and social norms, but participants who intended to walk around shorebird flocks agreed more strongly about personal and social norms than participants who did not intend to walk around shorebird flocks. Also, most beach walkers were not willing to walk the recommended buffer distances that are outlined in the literature review by Mengak et al. (2019). Based on these findings, it might be beneficial for future campaign efforts to improve attitudes, knowledge, and skills using education and outreach campaigns that employ strategies from the CBSM literature.

**STRATEGIES**

**RECOMMENDED STRATEGIES FROM COMMUNITY-BASED SOCIAL MARKETING**

Step 2 of CBSM calls for identifying barriers/constraints and benefits to a behavior that an agency/organization wishes to promote. After uncovering the benefits and barriers/constraints, McKenzie-Mohr (2011) outlines seven strategies that can be used to influence behavior. The strategies used will depend on the results of the benefits and barriers/constraints analysis. These strategies can be applied together or individually to increase the benefits and decrease the barriers/constraints, ultimately encouraging the behavior. Below we describe the seven strategies and provide examples of how each strategy can be applied.

1. **Communication:** Communication is the act of imparting or exchanging information. There are a variety of communication approaches that range from being resource intensive to being resource limited. Here, we broadly outline three communication approaches that can be carried out with varying degrees of on the ground labor, funding, and resources. The communication approaches that we outline are not the only methods for communication; they offer agencies and organizations the opportunity to choose a method of communication that is feasible to implement based on their resources capabilities.

    - **Interpretation:** Interpretation involves using interpretive principles to relay messages through a variety of mediums such as signs, talks, guided tours, exhibits, demonstrations, and information stations. Interpretation goes beyond providing factual information. In his groundbreaking book, *Interpreting Our Heritage*, Tilden defines interpretation as, “an educational activity which aims to reveal meaning and relationships through the use of original objects, by first-hand experience, and by illustrative media rather than simply to communicate factual information.” Interpretation strives to be interesting and entertaining to the audience (Tilden, 1957, p. 33).

    - **Environmental Education:** According to the North American Association for Environmental Education, “environmental education (EE) is a process that helps individuals, communities, and organizations learn more about the environment, and develop skills and understanding about how to address global challenges. It has the power to transform lives and society. It informs and inspires. It influences attitudes. It motivates action. EE is a key tool in expanding the constituency for the environmental movement and creating healthier and more civically-engaged communities.”

    - **Community Outreach:** Community outreach can be used to describe a range of activities that aim to inform, consult, or engage a target audience. The type of outreach performed, and the degree of outreach conducted will depend on an organization’s or agency’s goal and target population (The Ottawa Neighbourhoods Social Capital Forum et al., 2016).

2. **Social norms:** Social norms are unofficial rules about how to behave in certain settings (Schwartz, 1973; 1977). Abiding by social norms is not legally required; however, if a person does not abide by a social norm, they may be looked down upon or shunned by other people in the setting. People share social norms with those who are important to them, such as friends, family, and co-workers. People may also share social norms with those they admire, such as celebrities, famous athletes, or politicians.

3. **Commitment:** Commitment is the act of agreeing to a request. The very act of committing to do something has the ability to change a person’s behavior. If a person commits to leashing their dog, they
may come to view themselves as a person who supports shorebird conservation. Later, when asked to commit to a larger request, such as walking their dog in a dog zone rather than near shorebirds, the person might have an innate desire to act consistently with their new attitudes because many people are driven to be seen as trustworthy and reliable (McKenzie-Mohr, 2011).

4. **Prompts**: Prompts are visual or auditory cues to remind people to engage in a behavior. Prompts should be noticeable, visually appealing, catchy, and self-explanatory. Prompts should be presented at the place where the action is intended to occur or as close as possible to the location where the action should occur.

5. **Incentives**: Incentives are rewards for engaging in a behavior. Rewards can be financial benefits, physical items, special privileges, or access to an area. Incentives can act as external rewards; therefore, they are ideal for situations where people lack intrinsic motivation to engage in a behavior. When providing incentives, staff or volunteers should: present the incentive at the time that the desired behavior occurs, make the incentive visible to draw people’s attention, and make the incentive large enough to be taken seriously. It is also important to keep in mind that removing incentives or ending incentive programs can remove motivation for engaging in the desired behavior. Strategies that instill intrinsic motivation are far more effective than strategies such as incentives, which provide external motivation. Therefore, we suggest pairing incentives with other strategies such as norms, commitment, and communication.

6. **Social diffusion**: Social diffusion is the process in which ideas are spread through conversations between people who trust each other or people who have similar interests and values. When using social diffusion, it is important to spread messages through a trusted or respected person in a community.

7. **Convenience**: Convenience is the act of increasing motivation to engage in a behavior by making the desired behavior easy and more appealing. Behaviors can be made more convenient by removing external barriers or by creating structural changes to the surrounding environment. Convenience can vary based on peoples’ perceptions so strategies that are based on convenience need to be uniquely crafted based on individual situations.

### ADDRESSING DISTURBANCE THROUGH CO-PRODUCED STRATEGIES

Below we provide two “menus” containing possible strategies to address issues related to disturbance from dog walking and beach walking. The strategies presented here are designed to reduce barriers/constraints and increase benefits in a way that is feasible and mindful of the realities that practitioners face on the ground. However, success can vary depending on site conditions, community buy-in or push-back, financial resources, and staff resources. We recommend that sites choose from the strategies below based on their ability to garner the resources needed to carry out each strategy.

### CHOOSING A ZONING STRATEGY VERSUS A CBSM STRATEGY

Managing dog-related disturbance exists on a spectrum from restrictions/regulations with associated enforcement to voluntary actions encouraged by approaches such as CBSM. Because each site is unique and
managed according to various agency/organization objectives, the type of management implemented can vary. For sites that have the primary goal of promoting wildlife conservation, creating shorebird zones (at sites with the best habitat for shorebirds and where dogs can feasibly be kept off the beach) and off-leash dog zones (at sites not used by shorebirds or with poor shorebird habitat) might be a feasible option, supported by the results from biological research (See *Data-Informed Needs Related to Disturbance Along the Flyway: Atlantic Flyway Disturbance Project: Biological Data Collection Report*) that show that shorebird behavior is negatively impacted and abundance is lower in areas that have people and dogs present. Alternatively, shorebird abundance is increased in areas where dog recreation is restricted (Hunt et al., 2021; Stigner et al., 2016). Below, we outline strategies (see *Developed Strategies to Address Dog-Related Disturbance*) that can be used to enhance the creation or implementation of dog zones and shorebird zones.

Because some sites have the primary goal of promoting recreation as well, it might not be feasible to create separate shorebird zones and dog walking zones. In these cases, voluntary (or regulated) leashing might be more appropriate. Although leashed dogs can still disturb shorebirds (Lafferty, 2001b), leashing can reduce the probability of disturbance and the number of shorebirds disturbed (Lafferty, 2001a). Leashing can also restrain dogs from roaming into shorebird habitats and thus can offer some level of protection to shorebirds at sites where disturbance levels are high (Weston & Stankowich, 2014). Below, we primarily outline strategies for encouraging voluntary leashing at sites where off-leash dog walking is permitted. The strategies below can also be adapted for encouraging leashing compliance at sites where leashing is required. According to shorebird managers, law enforcement can be ineffective; their presence is lacking on beaches because they are spread thin and have other greater priorities (Comber & Dayer, 2019a; Everly et al., 2021). Therefore, these strategies might be particularly useful to enhance leashing compliance at sites that lack law enforcement presence.

To choose a behavior to promote (e.g., walk dogs in designated dog zones only or voluntarily [or regulated] leashing of dogs), managers and biologists need to consider their site goals and the level of stakeholder support. Depending on these factors, managers can use the strategies below to promote one or both of the behaviors that exist on the management spectrum. If focused on walking dogs in designated dog zones, some of the proposed strategies may need to be adapted.
STRATEGY #1: COMMUNICATION (COMBINED WITH STRATEGY #6: SOCIAL DIFFUSION)

What the strategy entails

Community Outreach: Community outreach can be conducted by beach stewards who are recruited through community-oriented organizations such as the Rotary Club, Lions Club, Elks Club, or Kiwanis Club. Through the process of social diffusion, respected community members can share messages that increase the benefits and decrease the constraints to walking around shorebird flocks. These messages can be relayed through community outreach programs or events that incorporate principles of “Rare Pride Campaigns.” Rare Pride Campaigns inspire community members to take pride in the species and habitats that make their communities unique. Stewards can incorporate “Rare Pride” principles into programs such as guided walks by bringing recreationists to important shorebird sites and providing them with binoculars and scopes to view the rare shorebirds that share the beach with the local community.

Signs: Interpretive signs can be used to relay messages that increase the benefits and decrease the constraints to walking around shorebird flocks as well as messages that emphasize norms. Here are some example messages below:

1. Let them rest so they can nest, walk around flocks
   This phrase emphasizes the following benefits:
   • Walking around flocks can reduce disturbance to shorebirds while they nest
   • Walking around flocks can reduce disturbance to shorebirds while they rest

2. Walking through flocks while they eat will disrupt their lunch and make them retreat
   This phrase emphasizes the following benefit:
   • Walking around flocks can reduce disturbance to shorebirds while they eat
   This phrase reduces the following constraint
   • I don’t understand why there is a need to walk around shorebirds

3. Walking through flocks can give them a fright, instead, walk left or right
   This phrase emphasizes the following benefit:
   • Gives me satisfaction to know I’m not bothering them
   This phrase reduces the following constraint:
   • I don’t understand what there is a need to walk around shorebirds

Messages to enhance personal and social norms:
• Be a leader: walk around shorebird flocks
• Our community walks around shorebird flocks
• I protect shorebirds by walking around flocks
• In this town, we walk around flocks

Why the strategy would be used

Comber and Dayer (2021b) found that a constraint to walking around shorebird flocks was a lack of identification skills and knowledge related to shorebirds. Communication via community outreach and interpretation can be used to reduce these constraints by helping beach recreationists improve their shorebird recognition skills and by relaying messages about what shorebirds are and why it is important to walk around shorebird flocks. Because some beach recreationists recognize that a benefit to walking around flocks is reduced bird disturbance, messages about this benefit can act as reminders at beach entrances (see prompts) to beach recreationists who care about shorebirds but may have forgotten that walking around shorebird flocks is important for the conservation of shorebird species. Sings are also beneficial for sites that lack staff and volunteers because signs can relay messages in the absences of staff or volunteers.
How to roll out the strategy

Community Outreach: Guided shorebird walks can be advertised through visitor or tourist centers or posted to social media. Before implementing an event, agencies/organizations should check with the site owner to make sure that they have any necessary permits or permission to host events (if the landowner is different from the organization or agency). Agency/organization staff can recruit volunteers from respected community groups by contacting organization leaders and requesting an opportunity to meet with the group and present volunteer opportunities. After recruiting volunteers, agency/organization staff should plan to host a training program prior to the outreach event so all volunteers are clear on their roles, expectations, and the program goals. Program gear such as hats and t-shirts with the hosting organization or agency’s logo can be given out to volunteers during the training session so volunteers can be identified as program leaders. On the day of the guided walk, volunteers can be stationed at a designated location, for example a table under a tent so program participants can sign-in and provide contact information for future correspondence about events or information. After signing-in, volunteers can provide participants with binoculars and information about where to meet the program leader for the guided walk.

Signs: You can access pre-designed signs on the Atlantic Flyway Shorebird Initiative outreach database. You could also create signs with the messages above by partnering with a local university to receive assistance from students in graphic design (see section on creating partnerships) or by using a freelance artist through https://www.fiverr.com. If you plan to design your own signs, it is important to consider the interpretive principles outlined in the section Creating Interpretive Signs.

Once you have a sign design, you can have it printed using a variety of companies. Sign size and placement will vary based on your site’s conditions and your site objectives. In general, it is best practice to position signs at the location where you would like the behavior change to occur. For example, if you want beach recreationists to walk around flocks, signs should be placed at beach entrances so everyone entering the beach can be informed about this behavior that they should engage in. Once you decide on the sign location, the sign manufacturer should be able to provide you with specific guidance on how to install your signs.

Resources needed to roll out the strategy

Outreach Events:
• Volunteer coordinator
• Volunteer stewards
• Staff time to train volunteer stewards
• Training materials for bird stewards on how to develop and lead guided walks (we suggest Ham (1992), Chapter 5).
• T-shirts, hats, or some type of clothing to identify the beach stewards as program guides.
• Binoculars and/or spotting scopes
• A tent and table for a booth
**Signs:**
- Staff time to design signs or a partner with a graphic designer
- A durable, weather-resistant sign
- Materials to install the sign. The materials needed for installation will vary depending on the type of sign and the size of the sign.

**When to use the strategy**

**Community Outreach:**
Community outreach requires a great deal of planning and volunteer support so it is ideal to use this strategy when agencies/organizations have volunteer groups who are committed to help on a consistent basis and a volunteer coordinator.

**Signs:** Signs are an important behavior change tool and should be present at all sites (unless site conditions are not ideal for signs because they might float away or be stolen). Signs are particularly ideal for sites that have limited staff and volunteers because signs can relay messages to beach recreationists in situations where staff and volunteers are not able to be present on the beach. Yet, signs alone without the presence of staff or volunteers may not be as effective in changing behavior and/or ensuring compliance. Therefore, signs should be the first step in a strategy but the addition of in-person outreach is a key next step if agencies/organizations can afford it.

**Example sites that have used the strategy**

**Community Outreach:** Birdlife Australia hosted a “beach walk” program to provide beach recreationists with the opportunity to see some of the protected birds at Killarney Beach. During the program, stewards educated beach recreationists about the “quirky behaviors” of beach-nesting birds to increase people’s interest in helping shorebirds.

**Signs:**
Audubon New York worked with local secondary schools to create “Share the Shore” artwork designed by students. The signs use interpretive principles such as keeping messages brief and using colorful imagery to urge beach walkers to be cautious while walking on the beach.
STRATEGY #2: SOCIAL NORMS

What the strategy entails
Demonstrate that shorebird appreciation is a social norm by creating places for beach recreationists to observe shorebirds from a safe distance. Areas could include temporary viewing areas made of symbolic fencing, mobile blinds, and tents, or permanent structures such as observation platforms or towers.

Why the strategy would be used
Comber and Dayer (2021b) found that the top benefits to walking around shorebird flocks were being able to enjoy watching shorebirds in their natural state and reducing disturbance to shorebirds while they eat, rest, and raise chicks. Furthermore, beach recreationists who intend to walk around shorebird flocks have stronger norms, on average, for walking around flocks. By creating a designated shorebird viewing area, the norm to walk around flocks and the benefits to walking around flocks can be increased. Beach recreationalists who see people viewing a shorebird flock at the designated viewing area will be less likely to walk through the flock because they will likely not want to be seen as going against the norm by disturbing shorebirds or the people viewing and photographing the shorebirds.

How to roll out the strategy
Viewing areas can be created by choosing an area where recreationists can observe shorebirds from a distance that minimizes flight initiation. The flight initiation distance of shorebirds can vary by species; therefore, we recommend reviewing Table 2 by Mengak et al. (2019) to determine the distance needed based on the species at your site. Once you determine how much space is needed between a viewing area and shorebird flock, you can install temporary or permanent viewing structures. Temporary or mobile viewing areas are beneficial because they can be moved from one year to another or as shorebird flocks move across the landscape. Temporary viewing areas could be tents or viewing blinds whereas permanent viewing areas can be structures such as observation platforms or towers. Permanent structures are considerably more expensive than temporary or mobile viewing areas. Permanent structures can be built in-house or through a
contractor. For a detailed review on how to choose a viewing area for your site, and how to create viewing areas, refer to: A guide to wildlife viewing and photography blinds: Creating facilitates to connect people with nature.

**Resources needed to roll out the strategy**
The resources needed will depend on the type of viewing area you choose to implement. Temporary structures can be purchased for $50 - $1,000. Permanent structures will require building permits and possibly permits from environmental regulatory agencies.

**When to use the strategy**
Temporary structures are a good option for sites that change in morphology or bird use throughout a season or from year to year. They are also a good option for agencies or organizations who might not be able to secure building permits for constructing permanent structures. Temporary structures are relatively inexpensive compared to permanent structures so they are also a good option for agencies/organizations that have limited budgets.

Permanent structures are a good option for sites that are regularly used by shorebirds year-after year. Permanent structures can be expensive to build and labor intensive so this strategy is best suited for agencies/organizations that have funding and staff who are skilled in constructing weather-tolerant structures as well as staff who monitor potential vandalism issues.

**Example sites that have used the strategy**
Arrowwood National Wildlife Refuge (NWR) and Birding Drives Dakota constructed two mobile wildlife viewing blinds for the public to observe the mating dance of sharp-tailed grouse on the NWR. The blinds are 6-foot by 10-foot with adjustable openings that allow up to five people to view the birds.

**STRATEGY #3: COMMITMENT**

**What the strategy entails**
Ask beach users to commit to walking around shorebird flocks through an online pledge, which is a written agreement to do a behavior. Agency/organization staff can specifically ask beach walkers to: “Walk around the flock.” The online pledge platform can also serve as a place for beach users to learn information more about the impacts of beach walking on shorebirds.

**Why the strategy would be used**
An online pledge can be used to reinforce messages related to the benefits of walking around flocks such as reducing disturbance to shorebirds while they eat, rest, and raise chicks. Through the online pledge, beach users can explore links to online educational materials where they can learn more about the impacts of beach walking on shorebirds. This method can help decrease constraints related to skills (not being able to recognize which birds are considered shorebirds) and can enhance knowledge.

**How to roll out the strategy**
An online pledge can be set up on an agency or organization website. It is best practice to encourage behavior change at the specific location where you would like the change to occur, so we suggest posting signs at beach entrances that prompt beach users to “take the pledge,” by scanning a QR code. As an
additional option to this strategy, agencies and organizations can ask beach users to enter their mailing address to receive a free bumper sticker (see incentives) with norm-based messages (see “messages to enhance personal and social norms” in the communication section). Beach users can also be given the option to share their online pledge via social media platforms such as Facebook or Instagram. Sharing commitment through an online pledge can enhance the visibility of walking around flocks as a community norm (see norms).

**Resources needed to roll out the strategy**
- An online platform for hosting the pledge campaign
- A sign with a QR code (for sign design, see communication)
- Optional: Incentive items (see incentives)

**When to use the strategy**
An online pledge is ideal for agencies/organizations that have staff or volunteers who are skilled in website design. This strategy is also ideal for situations where in-person pledge campaigns are not feasible, for example during the COVID-19 pandemic.

**Example sites that have used the strategy**
Purdue University launched an online campaign called “Heart of the Tippy” aimed at protecting endangered freshwater mussels in the Tippecanoe River. Although this example is not related to shorebirds, it is an excellent example of an online pledge campaign grounded in community-based social marketing. The campaign includes a website with a link to an online pledge where people who live near or recreate along the Tippecanoe River are prompted to click the commitment actions below:

Before signing the pledge, a map is displayed to show the locations of campaign participants. By showing this map, the campaign organizers are demonstrating that protecting freshwater mussels is a norm. Additionally, people who live near the river are asked if they would like a yard sign to display their pledge. Offering yards signs to display commitment is also a great way to enhance the norm of a behavior.

In addition to having a pledge, the website also offers a link to “meet our mighty mussels” so people can learn to identify the different mussel species. Another link, “more about mussels,” takes viewers to a page where they can learn about the life history of mussels and the threats they face. Lastly a link directs viewers to a page called “how can I help,” which features unique suggestions for protecting mussels based on different user groups and age groups.

STRATEGY #4: PROMPTS

What the strategy entails
Remind beach users to walk around shorebird flocks rather than walking through them by posting signs near where people will encounter the birds with brief messages, such as “Don’t be the cause of their fright, remember to alter your path left or right.” The signs could also depict an icon with a shorebird flock and an arrow pointing to a path around the flock so beach recreationists can visualize what they are being reminded to do.

Why the strategy would be used
Beach walkers reported that they are willing to walk around shorebird flocks (Comber & Dayer, 2021b). But even when people are willing to engage in a behavior, sometimes they simply forget to do the behavior (McKenzie-Mohr, 2011). Using prompts can help by reminding people to “walk around flocks.” Prompts can be particularly helpful when staff or volunteers are limited in their ability to be on site.

How to roll out the strategy
Download free sign designs on the AFSI website or partner with a graphic designer to create your own sign (see Creating Interpretive Signs). Provide the sign design to voss.com or another sign manufacturer who can print the sign on durable, weather resistant material such as plastic. Prompts are most effective when they are presented at the time and place that you wish to encourage the behavior. Therefore, it would be best to place signs at beach entrances or in front of areas where shorebirds flock are known to congregate.

Resources needed to roll out the strategy
- Signs with a prompt message and/or icon
- Installation materials

When to use the strategy
This strategy is ideal for agencies/organizations who have a limited number of staff and are not able to have staff on-site.

Example sites that have used the strategy
Marriott Resort and Audubon Florida partnered to raise awareness about the presence of protected shorebirds on the beach in front of the Marriott Resort at Marco Island. In past years, 600+ black skimmers nested in this area so Audubon Florida and the director of recreation for Marriott Resorts worked together to install a sign that urges beach users to walk around flocks.
STRATEGY #5: INCENTIVES

What the strategy entails
Provide a reward to beach users who commit to walking around shorebird flocks (see commitment). Rewards should be relevant to the context of beach recreation, for example, water bottles, t-shirts, hats, sunscreen, etc.

Why the strategy would be used
Comber and Dayer (2021b) found that beach walkers felt neutral about norms related to walking around shorebird flocks. Although beach recreationists are not opposed to walking around flocks, they are not highly motivated to engage in the behavior. Because incentives are ideal for situations where people lack intrinsic motivation, providing external motivation in the form of incentive can be a way to encourage beach recreationists to walk around shorebird flocks.

How to roll out the strategy
Incentives can be given out to people who commit to walking around shorebird flocks via signing a pledge (see commitment). If a pledge campaign is conducted online, campaign organizers can ask people who pledge to enter their name and mailing address so campaign organizers can mail the incentive items. If pledge campaigns are in person, staff or volunteers can simply hand incentive items to people who pledge.

Resources needed to roll out the strategy
The resources needed will depend on the incentive you decide to provide. If you use a company that can custom print icons or messages, then you can provide a variety of incentives while also demonstrating norms related to walking around flocks (see norms).

When to use the strategy
Incentives are ideal for situations where extrinsic motivation is needed because people lack intrinsic motivation to engage in behavior change. Incentives are specifically ideal for agencies/organizations who have funding to purchase incentive items.

Example sites that have used the strategy
After people signed the Heart of the Tippy pledge (shown under Commitment – Examples of sites that have used the strategy), the campaign organizers asked for participants to enter their contact information so the organizers could mail either a floating keychain, string bag/backpack, logo sticker or mighty mussel sticker.
STRATEGY #7: CONVENIENCE

What the strategy entails
Make it easy to walk/recreate in areas that are not used by shorebirds by creating footpaths that direct beach recreationists to areas of the beach that are not used by shorebirds. Likewise, if existing footpaths direct beach walkers to areas used by shorebirds, footpaths can be “removed” by planting vegetation.

Why the strategy would be used
Comber and Dayer (2021b) showed that some people lack shorebird recognition skills. One approach to reduce this constraint could be to direct beach users to recreate in areas of the beach that are less likely to be used by shorebirds.

How to roll out the strategy
The following steps may need to be adapted based on individual agency/organization requirements and regulations.

Footpath via vegetation removal: The most inexpensive approach to creating a footpath involves removing vegetation on the beach. Before starting this project, agency/organization staff should obtain permission or any necessary permits before conducting work. After getting permission, staff and volunteers can begin the project by using stake flags to outline the area that will be impacted. Within this area, experienced staff should inventory the plants or wildlife that might be affected by the project and confirm that endangered, threatened, or at-risk species will not be impacted by the process. If endangered threatened or at-risk species might be impacted, staff should adjust the staked area as needed to minimize harm. After choosing the area for the footpath, volunteers or staff can begin the process of vegetation removal. Vegetation can be removed by hand-pulling or using manual tools.

Footpath via roll-out mats: Foot paths can also be created using roll-out walkways. This approach might be particularly effective in areas where vegetation is sparse and delineating a path might be difficult. Roll-out mats can be moved from year to year, which can be advantageous if shorebirds use different areas of the beach. Many roll-out mats are ADA compliant, so they can serve a dual purpose by directing people away from shorebirds and enhancing accessibility for individuals with disabilities. Roll-out footpaths can be purchased from a variety of vendors. Prices range based on the length and construction material of the mat. Roll-out mats can be made using rubber, recycled polyester or plastic, and wood.

Resources needed to roll out the strategy
General resources needed for creating footpaths:
Agencies and organizations can send press release statements to local newspapers or post messages on social media to alert dog walkers about new access points/paths. Signs (see communication) can also be placed at the path entrances to prompt dog walkers to enter the beach at these new locations when they arrive. String/rope fence can be placed along the edge of the paths to increase their visibility and prevent dog walkers from going beyond the paths and into the surrounding vegetation.

Specific resource needed for each type of footpath:
Footpath via vegetation removal: Hand tools, work gloves, compost bags to dispose of removed vegetation, stake flags.

Footpath via roll-out mats: Here are some examples of roll-out mats. We do not endorse any of these mats, but merely provide them as examples of types of roll-out mats that are available.
- [https://www.mobi-mat-chair-beach-access-dms.com/ada-roll-out-walkway-access-mat/](https://www.mobi-mat-chair-beach-access-dms.com/ada-roll-out-walkway-access-mat/)
- [https://www.accessrec.com/mr-boardwalk-beach-access-walkway](https://www.accessrec.com/mr-boardwalk-beach-access-walkway)
When to use the strategy

**Footpath via vegetation removal:** Creating footpaths via vegetation removal is ideal for agencies/organizations that have large volunteer groups because this strategy can be labor intensive. This strategy is also ideal for agencies/organizations that have the necessary budget and staff to support this project.

**Footpath via roll-out mats:** Roll-out mats are ideal for agencies/organizations that have funding available because roll-out mats can be costly. Roll-out mats are also ideal for sites that lack vegetation because in the absence of vegetation, mats can be used to create visually distinct pathways.

**Example sites that have used the strategy**

**Sunken Meadow State Park** in New York has two parking lots that have pathways leading to the beachfront. In early June, park staff were short on lifeguards, so they only allowed beach recreationists to swim in the beach area connected to parking lot 1 (we will refer to this area as A1). To funnel beach recreationists towards A1, the staff opened parking lot 1 and closed parking lot 3. Although the entire beach was open for use, the only way beach recreationists could access the beach area in front of parking lot 3 (we will refer to this area as A2) was to walk ¾ of a mile down the beach from A1. As a result of this inconvenience, most beach recreationists stayed close to A1 and avoided A2. This proved to be advantageous for a colony of nesting least terns and a piping plover pair that were located at A2. By manipulating the flow of traffic on the beach, park staff were able to keep beach users away from the nesting area until July. In early July, more lifeguards were on staff, so parking lot 3 was open to allow easy access to the newly opened swimming area at A2. This action caused more people to use A2, and also enhanced the level of disturbance near the nesting area.
STRATEGIES TO ADDRESS DOG-RELATED DISTURBANCE
STRATEGY #1: COMMUNICATION

What the strategy entails
Community Outreach: Community outreach can be used to relay messages that increase benefits and decrease constraints to leashing and encourage dog walkers to find excitement in seeing rare birds. Community outreach can model “Rare Pride Campaigns” by inspiring people to take pride in the species and habitats that make their communities unique. Beach stewards can evoke pride among dog walkers by taking them on guided bird walk programs. Stewards can bring dog walkers to important shorebird sites and provide them with binoculars and spotting scopes to view nesting birds.

Information Stations: Depending on agency or organization goals and resources, information stations can be simple or elaborate. Information stations can be mobile or temporary, such as a table at a beach entrance or they can be permanent such as a visitor center. Whether temporary or permanent, information stations should be staffed and function to 1) welcome visitors to the area, 2) orient visitors to the area, 3) sensitize visitors to the area’s values, 4) respond to visitor’s needs, and 5) interpret the site (Ham, 1992). Through interpreting the site, staff or volunteers can distribute information packets to dog walkers. Information packets can aim to educate dog walkers about the potential harm that dogs can have on shorebirds, ways to minimize the impacts of disturbance from dogs, and maps with alternative dog walking areas in the local community.

Signs: Signs can be used to relay messages that increase the benefits and decrease the constraints to leashing dogs near shorebirds. Here are some example messages below:

**Possible messages to emphasize benefits:**
- Keep your dog safe. Leash on the beach.
- When you see a nesting area on the beach, keep dogs leashed and shorebirds out of their reach.

**Possible messages to reduce constraints:**
- To shorebirds, even well-behaved dogs are scary.
- Does your dog love to run and play? They’ll enjoy the dog zone.

Why the strategy would be used
Community Outreach and Information Stations: While conducting surveys, Comber and Dayer (2019b) found that some dog walkers did not know where shorebird nesting areas were located on beaches. This was particularly an issue at sites that did not have symbolic fencing or closures. Dog walkers sometimes thought shorebirds lived in dune systems or confused beach-nesting bird areas for other wildlife nesting areas such as tortoises or sea turtles. Having information stations and community outreach guided by staff or volunteers can reduce some of the knowledge-gaps and improve awareness about shorebirds among dog walkers.

Signs: Comber and Dayer (2021a) found that preventing dogs from running into nesting areas, keeping dogs safe and preventing dogs from bothering people were the top benefits to leashing dogs on beaches. Alternatively, some dog walkers did
not think leashes were necessary because their dogs were obedient. According to some shorebird managers, signs can be effective for managing human disturbances (Comber & Dayer, 2019a). Therefore, interpretative signs can be used to relay messages about benefits and constraints to leashing and can encourage dog walkers to leash their dogs or use alternative dog walking areas in the community.

**How to roll out the strategy**

**Community Outreach:** Bird walk programs can be advertised through visitor or tourist centers to gain interest from vacationers. The programs can also be advertised at local veterinarian offices, animal shelters, or pet stores to gain interest from local dog walkers. Event advertisements can also be posted to social media, for example through public Facebook groups associated with dog walking clubs or local governments. Before implementing an event, agencies/organizations should check with the site owner to make sure that they have any necessary permits or permission to host events (if the landowner is different from the organization or agency). Agency/organization staff should also plan to host a training program prior to hosting the outreach event so all volunteers are clear on their roles, expectations, and the program goals. Program gear such as hats and t-shirts with the hosting organization or agency’s logo can be given out to volunteers during the training session so volunteers can be identified as program leaders. On the day of the outreach event, volunteers could be stationed at a designated location, for example a table under a tent so program participants can sign-in and provide contact information for future contact about events or information. After signing-in, volunteers can provide participants with binoculars and information about where to meet the program leader for the guided walk.

**Information Stations:** Temporary information stations can be created by setting up a portable table and outdoor tent at beach access areas. At least one volunteer or staff member should be present to greet visitors and interact with them. Staff or volunteers should be identifiable by uniform apparel with the site logo or name. Providing or using interpretive aids such as photos, mini-shorebird exclosures with artificial shorebird nests, or taxidermy shorebird specimens can help spark conversations about the impacts of dogs on shorebirds. Volunteers and staff can offer dog walkers information packets that include fact sheets about shorebirds and the impacts of dogs on shorebirds, and a list/map of alternative areas to walk dogs.

**Signs:** Agency/organization staff can access pre-designed signs on the [Atlantic Flyway Shorebird Initiative outreach database](https://www.affric.org/afttf.html). Agency/organization staff can also create signs by partnering with a local university to receive assistance from students in graphic design (See Creating Partnerships) or by using a freelance artist through sites such as [https://www.fiverr.com](https://www.fiverr.com). If agencies/organizations plan to design their own signs, it is important to consider the interpretive principles outlined in this document (see Creating Interpretive Signs).

Sign size and placement will vary based on the site conditions and site objectives. In general, it is best practice to position signs at the location where the behavior change needs to occur. For example, if agencies/organizations want dog walkers to leash near nesting areas, signs should be placed just before dog walkers approach the nesting areas. If agencies/organizations want dog walkers to leash on the entire
beach, staff could place signs at beach access points. After choosing a sign location, refer to the sign manufacturer for specific guidance on installation. Small signs, such as plastic 12x12 signs, can simply be attached to metal, wood, or PVC stakes, using screws or zip ties. Metal stakes can be placed in the sand using a post-pole pounder and wood or PVC stakes can be placed in the sand by making a hole using a power drill with an auger drill bit.

**Resources needed to roll out the strategy**

**Community Outreach:**
- Volunteer coordinator
- Volunteer beach stewards
- Staff time to train bird stewards
- Training materials for bird stewards on how to develop and lead guided walks (we suggest Ham (1992), Chapter 5).
- T-shirts, hats, lanyard ID cards, or some type of clothing to identify the beach stewards as program guides.
- Binoculars and/or spotting scopes
- A tent and table for a booth information packets that include map or lists of alternative dog walking areas in the local community

**Interpretation (Information Stations):**
- Volunteers or staff to attend the information station
- Uniform apparel (e.g., t-shirt) with the logo or name of the host agency/organization
- Portable table
- Portable tent
- Information packets consisting of fact sheets about shorebirds, the impacts of dogs on shorebirds, and a list/map of alternative dog walking areas in the local area.

**Interpretation (Signs):**
- Staff time to design signs or a partner with a graphic designer
- A durable, weather-resistant sign
- Materials to install the sign

**When to use the strategy**

**Community Outreach and Interpretation (Information Station):** Community outreach and information stations are resource-intensive strategies so they could be used when agencies/organizations have available staff, are able to hire seasonal staff, or coordinate volunteers on a consistent basis.

**Interpretation (Signs):** Signs are an important behavior change tool and should be present at all sites (unless site conditions are not ideal for signs because they might float away or be stolen). Signs are particularly ideal for sites that have limited staff and volunteers because signs can relay messages to beach recreationists in situations where staff and volunteers are not able to be present on the beach. Yet, signs alone without the presence of staff or volunteers may not be as effective in changing behavior and/or ensuring compliance. Therefore, signs should be the first step in a strategy but the addition of in-person outreach is a key next step if agencies/organizations can afford it.
Example sites that have used the strategy

Community Outreach: Birdlife Australia has hosted several “Dog’s Breakfast,” events aimed at providing information about shorebirds to dog walkers in a friendly and non-confrontational way. Tips on holding a Dog’s Breakfast can be found at: https://birdlife.org.au/documents/bnb_How_to_run_a_Dogs_Breakfast.pdf

Information Station: Audubon Western Everglades biologists and volunteers set up information stations near tern and skimmer colonies at Tiger Tail Beach in Marco Island and Carlos Pointe in Fort Myers. Stewards provide outreach materials to beach-goers passing by and set up spotting scopes under shaded tents so beach-goers can see the nesting birds.

Signs: The Atlantic Flyway Shorebird initiative created this interpretative sign to share with sites across the Atlantic Flyway. The sign is available at: https://atlanticflywayshorebirds.org/outreach-materials/. The sign uses interpretive principles such as keeping messages brief and using bright, colorful imagery. The sign addresses the barrier that leashing is not necessary for dogs that are well behaved by reminding dog walkers that “even good dogs frighten beach birds.”
CREATING INTERPETIVE SIGNS

We encourage agencies and organizations to use universal signs when they meet the site needs. However, agencies and organizations may still need to create some site-specific signage. For best results, we suggest that agencies and organizations partner with skilled interpreters (see Creating Partnerships). If interpreters are not available within an agency or organization, webinars and online training sessions can provide a foundation for building interpretive skills. Webinars and online training sessions can be found at: https://www.interpnet.com/NAI/interp/Certification/nai/_certification/NAI_Certification.aspx?hkey=0c08ac07-c574-4560-940f-82fba3a22be9

Furthermore, if an agency or organization creates their own signage, we suggest using evidence-based guidance on how to design effective signs. Resources on creating interpretive signs can be found at: https://www.nps.gov/grte/learn/management/upload/interp.pdf. Additionally, we provide guidelines below based on: Ham, S. (1992). Environmental Interpretation: A Practical guide for people with big ideas and small budgets. North American Press: Golden Colorado, USA.

Guidelines for Interpretation

Interpretation should be:
1) Pleasurable
2) Organized
3) Relevant
4) Thematic

Pleasurable

To make pleasurable signs that are interesting and entertaining you could:
- Express your message visually using photos, illustrations, graphics and symbols.
- Engage the five senses by making signs participatory, game-like, colorful, or by incorporating movement and sound.
- Incorporate unique and novel elements into the signs that can help capture the viewer’s attention.
- Create a balance of white space (open space that allows the eyes to rest) between text and graphics.
- Balance the spacing between lines.
- Use a clear, easy-to-read typeface such as San Serif. Avoid cursive (it can be difficult to read) and all caps (it can relay a negative tone).
- Use a color scheme with one predominant color and one or two accent colors that harmonize with the predominant color.
  - You can choose a predominant color based on the topic of the exhibit, the colors in the surrounding area, or existing art and exhibits.
  - You can choose accent colors based on the position of colors on the color wheel. Colors that are opposite or adjacent to each other are visually appealing whereas colors that are separate (but not opposite) don’t generally harmonize well.
  - Use the following website to check your colors for those visually impaired or color blind. http://www.vischeck.com/.
ORGANIZED
To organize sign content, you could:
- Present information in a way that is effortless for the audience to follow
- Introduce the overall theme using a thematic title that is provoking so that the audience is drawn to look beyond the title.
- Include subheadings to show the main points.
- Most people are only able to make sense of 5-9 ideas at once, so the number of main points should be 5 or fewer. In general, signs should contain even fewer main ideas (1-2) because, on average, people spend just a few seconds looking at signs.

RELEVANT
Interpretation should be relevant to the audience by using content and elements that are meaningful and personal. Meaningful content is content that people can connect to because they understand it in the context of something else that they have experienced. Personal content is content that people care about such as family, health, personal well-being, quality of life. Content that resonates with their values, beliefs and convictions will also be most relevant.

To make content relevant to the audience, you could:
- Bridge unfamiliar concepts or ideas to things visitors know about. You can do this by using similes or metaphors to make comparisons.
- Connect what you are presenting to the lives of visitors by 1) posing questions and asking visitors to think about themselves and their own experiences or by 2) using words like “you”, “your”, “we”, “ours” and “us”.

THEMATIC
Interpretation should have a topic and a theme. The topic is the subject matter, and the theme is the main point or the specific message about the subject. The theme should be clear so that visitors can recognize it in 1-2 seconds. If you were to write a theme out, it should be a complete sentence with a subject, a verb, and a period at the end. Then you could build your sign around this theme by developing it with two or less main ideas (or five or less main ideas for other interpretive approaches such as guided walks).

Example topic: Shorebirds
Example theme: Leashing dogs on the beach can minimize harm to shorebirds.
STRATEGY #2: SOCIAL NORMS (COMBINED WITH STRATEGY #6: SOCIAL DIFFUSION)

What the strategy entails
The norm to leash near shorebirds can be established through dog walking ambassadors modeling this behavior. Through the process of social diffusion, dog walking ambassadors can have informal conversations with other dog walkers and share messages about the benefits of leashing dogs near shorebirds or the advantages of walking dogs in alternative areas that are not being used by shorebirds. Additionally, ambassadors can encourage leashing by thanking people who have their dogs leashed.

Why the strategy would be used
Comber and Dayer (2021a) showed that dog walkers have strong social norms, which are based on the thoughts and opinions of people in their reference group. Social diffusion is the process in which people share information within their reference group or with people who they view to be similar to themselves. Therefore, if fellow dog walkers share norm-based messages about the benefits to leashing with dog walkers who have their dogs off-leash, the norm to leash can be established.

How to roll out the strategy
- Recruit dog owners who regularly walk the beach.
- Host a dog walker training session where dog walkers can learn how to educate visitors about the impacts of dogs on shorebirds, dog walking zones, general dog walking regulations, and where dogs can go off-leash (if anywhere).
- Provide dog walking ambassadors with identifiable gear such as vests, t-shirts, or kerchiefs for their dogs.
- Provide dog walking ambassadors with talking points about the benefits to leashing so they can convey messages to fellow dog walkers.

Resources needed to roll out the strategy
- Recruitment materials
- Training materials for dog walking ambassadors
- Volunteer coordinator
- Volunteer ambassadors
- Staff time for training ambassadors
- Gear for ambassadors to wear so they can be identified

When to use the strategy
Using social norms as a strategy is ideal for agencies/organizations that have a large volunteer group with dedicated volunteers who are willing to walk their dogs on a regular basis.
Example sites that have used the strategy
Sleeping Bear Dunes National Lakeshore in Michigan, USA hosts the B.A.R.K. Ranger program. Through this program, volunteer dog walkers encourage other dog walkers to Bag pet waste, Always leash, Respect wildlife, and Know where you can go. BARK Rangers model compliant dog walking behaviors and inform visitors in a friendly manner about park leash requirements and the locations open for dogs and areas closed. When BARK Rangers encounter visitors that have dogs off leash in permitted areas or any dogs (leashed or not) in closed areas, they explain why leashes are important and how even the best-behaved dogs can impact nesting piping plovers and other park wildlife. Volunteers also make appearances at park sponsored events and programs and assist visitors in finding visitor centers, points of interest, hiking trails, and provide general park information.

More information about the B.A.R.K Ranger program at Sleeping Dunes National Lakeshore can be found at:
https://www.nps.gov/slbe/learn/news/is-your-dog-a-bark-ranger.htm
https://friendsofsleepingbear.org/bark-rangers-and-piping-plover/

STRATEGY #3: COMMITMENT

What the strategy entails
Commitment from dog walkers can be elicited in the form of a pledge. Pledges are written or verbal agreements to do a behavior. Agency/organization staff can ask dog walkers to commit to doing different behaviors related to protecting dogs from shorebirds. Here we outline two options for pledge campaigns.

Pledge to leash: Ask dog walkers to commit to leashing their dogs when they walk near shorebirds

Pledge to use dog zones: Ask dog walkers to commit to walking their dogs in areas of the beach that are zoned for dog walking.

Why the strategy would be used
Dog walkers recognize that leashing is beneficial for keeping dogs away from areas for beach nesting birds, but dog walkers also feel that leashing can reduce a dog’s ability to exercise and socialize. The “pledge to leash” can increase the benefit of keeping dogs away from shorebirds whereas the “pledge to use dog zones” can decrease the barrier of reduced exercise and socializing by allowing dogs to run freely in areas of the beach that are not used by shorebirds.

How to roll out the strategy
There are two types of pledge campaigns that agencies/organizations can host: a photo pledge or a written pledge. A photo pledge involves beach users posing with a sign that states their pledge, for example, “I leash my dog near shorebirds.” The agency or organization hosting the pledge campaign can take a photo of the dog walker holding the sign and ask the dog walker to share their photo on social media with a hashtag such as #leashnearshorebirds. The hosting agency/organization can enter dog walkers (who post to the hashtag) into a raffle for a gift card to a local pet store or groomer. The possibility of winning a raffle can serve an incentive (see incentives) for dog walkers to post their photos to social media. Posting photos to social media can demonstrate that leashing is a norm and spread the visibility of this behavior through the community, (see norms).
A written pledge involves volunteers, interns, or staff, asking beach users to sign a statement, saying that they will leash their dogs near shorebirds. Beach users can sign a pledge when they register for parking or dog walking permits (where required). Alternatively, the agencies or organizations soliciting the pledge can set up a tent and table by the beach entrance so people can sign their pledge in a stationary area and interact with staff to learn more about shorebirds.

The pledge can simply be a signature using colorful pens or markers on a poster board or clipboard. If the agency or organization has a visitor center, the poster board can be displayed for the public to see that leashing dogs near shorebirds is presented as a norm (see norms).

Resources needed to roll out the strategy
For the photo pledge campaign, agencies/organizations will need signs with different pledge phrases or pledge hashtags (or a more elaborate setup could involve a cut-out shorebird for people and dogs to pose with), volunteers and a volunteer coordinator, interns or staff who can solicit pledges at beach entrances. For the written pledge agencies/organizations will also need volunteers, interns, or staff to solicit the pledge as well as pledge forms and clipboards, or a poster board, and colorful writing utensils.

When to use the strategy
Commitment in the form of a pledge campaign is ideal for agencies/organizations that have volunteers who can table these events because pledge campaigns can be time-consuming for staff who may have other work duties.

Example sites that have used the strategy
Audubon New York hosted the “Be a Good Egg” pledge, which strives to reduce human disturbance threats to coastal birds by encouraging people to “share the shore” with birds while visiting the beach. During outreach events, volunteers and staff ask beach users to take the “good egg pledge” to respect fenced-off areas where birds are nesting, properly dispose of or carry out your trash, and keep your dog off of nesting beaches.
STRATEGY #4: PROMPTS

What the strategy entails
Agencies/organizations can use interpretive signs (see communication) to remind people to leash their dogs near shorebirds or use dog walking zones on the beach. Prompts should be quick reminders that can be relayed in just a few seconds so messages should be short and brief. For example: “Wear a lead, so the plover can breed.”

Example Prompts:
Chicks have hatched, please leash dog until you reach the next “green light” sign

Why the strategy would be used
Failure to leash is not necessarily because people lack motivation. Sometimes people are not sure what birds are considered shorebirds or where shorebirds are found on the beach landscape (Comber & Dayer, 2019b). For instance, some people mistake shorebird nesting areas for turtle nesting areas or beach stabilization projects (C. Comber, personal communication). Further, some people think gulls are shorebirds and do not recognize the differences between various types of birds on the beach (Comber & Dayer, 2021b). Using prompts can remind people to leash dogs when they may not recognize situations that warrant leashing. Prompts are also beneficial because they can be used in situations where staff and volunteers are minimal.

How to roll out the strategy
Agencies/organizations can create signs with prompts and icons by partnering with a local university to receive assistance from students in graphic design (see partnership section) or by using a freelance artist through: https://www.fiverr.com. Agencies/organizations can also access pre-designed signs on the Atlantic Flyway Shorebird Initiative outreach database.

For prompts to be most effective, they need to be positioned at the place where the behavior change is intended to occur. Therefore, if agencies/organizations want dog walkers to leash near nesting areas, signs should be placed just before the nesting area so people can see the prompt as they approach and be reminded that leashing needs to occur in that specific area of the beach.

Resources needed to roll out the strategy
- Pre-designed signs from the AFSI resource page
- Staff time to design a sign or a partner with a graphic designer
- A durable, weather-resistant sign (if creating one)
- Materials to install the sign

When to use the strategy
This strategy is ideal for agencies/organizations who have a limited number of staff and are not able to have staff on-site. Also, if a site has a large population of vacationers who are not familiar with the local regulations, prompts can remind non-locals about the areas where they should leash.

Example sites that have used the strategy
The City of Holdfast Bay uses signs to remind dog walkers exactly where and when they should leash dogs on the beach.
STRATEGY #5: INCENTIVES

What the strategy entails
Provide dog walkers who leash or commit to leashing (see commitment) with rewards. Incentives should be relevant to the context of the situation so in this case, incentives should relate to beach recreation or dogs. There are many types of incentives that can be given out; some examples include discounts or gift certificates to local pet stores or dog groomers and pet-related items like dog toys, treats, leashes or dog apparel. Incentives could be paired with norms (see norms) by giving out incentive items such as leashes or bandanas with norm-based messages for other dog walkers to see.

Why the strategy would be used
Incentives are ideal for situations where people have little motivation for engaging in a behavior. Because some dog walkers feel that it is not necessary to leash their dogs because they are controlled by voice command (Comber & Dayer, 2021a), providing external motivation in the form of incentives can be one approach to overcome this barrier and engage dog walkers who otherwise would not leash.

How to roll out the strategy
Incentive Items:
● Discounts to local pet stores or dog groomers
● Gift certificates to local pet stores or dog groomers
● Dog toys
● Dog treats
● Leashes
● Dog apparel (e.g., bandana)

Incentive items can be given to dog walkers who commit (see commitment) to leashing or walking their dogs in dog zones. After signing a pledge, beach stewards can thank dog walkers by handing them incentive items. Staff or volunteers can also greet visitors at beach entrances during outreach events (see communications) and hand out incentive items as they welcome dog walkers.

Incentives can also be paired with communications by giving incentive items to dog walkers who read educational handouts about dog-related disturbance when they register for dog walking permits (where required). If agencies/organizations choose this route, they will need to partner with the permitting/registration office (see Creating Partnerships) to hand out the educational materials and incentives to dog walkers who register.

Resources needed to roll out the strategy
The resources needed will depend on the incentive items that the agency/organization decides to provide. If an agency/organization decides to include norm-based messages related to leashing, they can purchase incentive items with custom messages from websites that specialize in customized products. Agencies/organizations will also need volunteers or staff to organize procuring and handing out the incentive items.

When to use the strategy
Incentives are ideal for situations where people lack intrinsic motivation to engage in behavior change. If dog walkers are unwilling to change their behaviors, incentives could be used to provide external
motivation. Incentives are specifically ideal for agencies/organizations who have funding to purchase incentive items.

**Example sites that have used the strategy**

Birdlife Australia gives out a variety of incentive items during outreach events like the leash on the previous page with a norm-based message.

**STRATEGY #7: CONVENIENCE**

**What the strategy entails**

Make it easy to walk dogs in areas of the beach that are not commonly used by shorebirds by creating footpaths that direct dog walkers to these areas of the beach. Likewise, if existing footpaths direct dog walkers to areas used by shorebirds, footpaths can be “removed” by planting vegetation.

**Why the strategy would be used**

This strategy meets the needs of shorebirds by minimizing disturbance in areas that have high quality habitat while also decreasing constraints to leashing by providing dogs with unrestricted exercise and socialization in areas that are less likely to be used by shorebirds (Comber & Dayer, 2021a). In a survey to dog walkers, Comber and Dayer (2019b) found that dog walkers are supportive of restricting dog access for the protection of shorebirds, but the also value off-leash access for their dogs; thus this strategy can achieve both objectives.

**How to roll out the strategy**

The following steps may need to be adapted based on individual agency/organization requirements and regulations.

**Footpath via vegetation removal:** The most inexpensive approach to creating a footpath involves removing vegetation on the beach. Before starting this project, agency/organization staff should obtain permission or any necessary permits before conducting work. After getting permission, staff and volunteers can begin the project by using stake flags to outline the area that will be impacted. Within this area, experienced staff should inventory the plants or wildlife that might be affected by the project and confirm that endangered, threatened, or at-risk species will not be impacted by the process. If endangered threatened or at-risk species might be impacted, staff should adjust the staked area as needed to minimize harm. After choosing the area for the footpath, volunteers or staff can begin the process of vegetation removal. Vegetation can be removed by hand-pulling or using manual tools. This work can be labor intensive so using a large volunteer group may be an effective way to remove vegetation in expansive areas.

**Footpath via roll-out mats:** Foot paths can also be created using roll-out walkways. This approach might be particularly effective in areas where vegetation is sparse and delineating a path might be difficult. Roll-out mats can be moved from year to year, which can be advantageous if shorebirds use different areas of the beach. Many roll-out mats are ADA compliant, so they can serve a dual purpose by directing people away from shorebirds and enhancing accessibility for individuals with disabilities. Roll-out footpaths can be purchased from a variety of vendors. Prices range based on the length and construction material of the mat. Roll-out mats can be made using rubber, recycled polyester or plastic, and wood.

**Resources needed to roll out each strategy**

**General resources needed for creating footpaths:**

Agencies and organizations can send press release statements to local newspapers or post messages on social media to alert dog walkers about new access points/paths. Signs (see communication) can also be placed at the path entrances to prompt dog walkers to enter the beach at these new locations when they arrive. String/rope fence or wooden stakes can be placed along the edge of the paths to increase their...
visibility and prevent dog walkers from going beyond the paths and into the surrounding vegetation.

**Specific resource needed for each type of footpath:**

**Footpath via vegetation removal:** Hand tools, work gloves, compost bags to dispose of removed vegetation, stake flags.

**Footpath via roll-out mats:** Here are some examples of roll-out mats. We do not endorse any of these mats, but merely provide them as examples of types of roll-out mats that are available.

- [https://www.mobi-mat-chair-beach-access-dms.com/ada-roll-out-walkway-access-mat/](https://www.mobi-mat-chair-beach-access-dms.com/ada-roll-out-walkway-access-mat/)
- [https://www.accessrec.com/mr-boardwalk-beach-access-walkway](https://www.accessrec.com/mr-boardwalk-beach-access-walkway)

**When to use the strategy**

**Footpath via vegetation removal:** Creating footpaths via vegetation removal is ideal for agencies/organizations that have large volunteer groups because this strategy can be labor intensive. This strategy is also ideal for agencies/organizations that have the necessary budget and staff to support this project.

**Footpath via roll-out mats:** Roll-out mats are ideal for agencies/organizations that have funding available because roll-out mats can be costly. Roll-out mats are also ideal for sites that lack vegetation because in the absences of vegetation, mats can be used to create visually distinct pathways.

**Example sites that have used the strategy**

**Stumers Creek dog-friendly beach** in Queensland Australia has a footpath that was created via vegetation removal. This path encourages dog walkers to use this section of the beach by making it convenient and easy to access. Additionally, a dog wash area is provided to make this section of the beach more appealing for dog walkers to use.
BEYOND COMMUNITY BASED SOCIAL MARKETING

IMPLEMENTING DISTINCT DOG WALKING AND SHOREBIRD ZONES

What the strategy entails
Off-leash dog walking zones can be created at beaches or within portions of beaches that have low shorebird abundance and/or unsuitable shorebird habitat. Alternative beaches or portions of beaches that are frequently used by shorebirds or have high quality shorebird habitat can be designated as shorebird beaches with dog access prohibited.

Why the strategy would be used
A primary constraint to leashing dogs is reduced exercise and socialization (Comber & Dayer, 2021a). Regulation focused interviews with managers revealed that creating off-leash dog zones is an approach that some managers have used to provide shorebirds with areas that are free of dog-related disturbance. Additionally, zoning has been shown to enhance shorebird abundance with only a minimal cost to recreation (Stigner et al., 2016).

How to roll out the strategy
The process for creating off-leash dog zones and shorebird zones can vary based on each organization/agency, their sites, and the surrounding communities. Below we provide example management plans and planning guidelines related to creating and implementing off-leash dog zones. These resources can serve as references for agencies and organizations seeking to create their own unique plans. The resources we provide are not exclusive to zoning on beaches, but they can provide general guidelines for developing zones. From these resources, we have outlined key points that should be considered by all agencies and organizations who are interested in developing off-leash dog zones and shorebird zones. For detailed guidelines on best practices for developing and implementing zones, refer to the links below.

Key Steps for Developing Off-Leash Dog Zones and Shorebird Zones
1. Determine stakeholders: Stakeholders are groups or individuals who will affect or be affected by zoned areas.
2. Solicit input from stakeholders: Agencies and organizations can solicit feedback from the stakeholders in a variety of ways such as town hall meetings, focus groups, online or print surveys, letter-drop boxes etc.
3. Select dog zones and shorebird zones based on data: To create zones that balance the needs of shorebirds and dog walkers, agencies/organizations should develop zones based on shorebird occupancy and abundance models (see methods by Stinger et al., 2016), shorebird monitoring data, recreational use surveys, and GPS data on the space use of dogs on beaches (see methods by Schneider et al., 2020). After selecting dog zones, agencies/organizations should conduct an environmental impact assessment to ensure that at-risk, threatened, or endangered species will not be impacted by the creation of a dog zone in the proposed location.
4. Clearly communicate with stakeholders: All stakeholders should be aware of potential environmental impacts that zones might have on the beach environment prior to implementation. Moreover, stakeholders should be clearly informed about zone locations and policies/rules. Zone locations can be communicated on-site using signs, symbolic fencing, and beach stewards. Messages about environmental impacts and zone policies can be communicated using town hall meetings, drop-in sessions with public leaders, local government websites, and news releases.

5. Pilot-test off-leash dog zones and shorebird zones: Before large-scale implementation, agencies/organizations should conduct a small-scale pilot test to determine possible issues. If the pilot test proves to be effective, issues identified through the pilot test should be adapted and zones can be implemented more broadly.

**Off-leash Dog Zoning Resources**
- Station Beach Off Leash Dog Area Review of Environmental Factors: Community Engagement Report
- Station Beach Off Leash Area - Proposed Trial: Community Engagement Report
- Review of Environmental Factors: Station Beach Off-Leash Dog Area - Proposed Trial
- Cherry Creek State Park Dog Off-Leash Area Management Plan
- Seattle Parks and Recreation: People, Dogs, and Parks Plan
- Off-Leash Management Plan for Hidden Valley Regional Park
- Off-Leash Dog Areas Feasibility Study
- Guidelines For Establishment and Maintenance of Successful Off-Leash Dog Exercise Areas

**Resources needed to roll out the strategy**
- Site-specific zoning plan
- Signs and symbolic fencing to clearly delineate zones
- Various forms of communication mediums (social media posts, a press release, radio announcement, letter to local residents etc.) to inform community members about new beach zones and policies.

**When to use the strategy**
Off-leash dog zones and shorebird zones are ideal for sites where leashing compliance is low and law enforcement officers are not present to enforce existing regulations. Furthermore, zoning is ideal for beaches that have both high and low quality shorebird habitat, so zones can be designated to meet the needs of both shorebirds and dog walkers without further negative impact to shorebirds.

**Example sites that have used the strategy**
A trial off-leash dog area was created at Station Beach, Australia. However, due to a court ruling, dogs are no longer permitted at this location. Information about the trial-off leash area can be found in “Off-leash Dog Zoning Resources.”
MORE TIPS FOR IMPLEMENTING STRATEGIES

CREATING PARTNERSHIPS
Creating partnerships can be a valuable way to achieve agency or organization goals when resources and funds are limited. Partnerships can provide agencies and organizations with volunteer support for labor intensive strategies if staff are unavailable. For example, if an agency or organization is planning to roll out a convenience-based strategy (e.g., creating a footpath), but they don’t have the staff capacity, they could partner with local community organizations (e.g., Rotary, Kiwanis, Lions Club) to garner volunteers. Additionally, partnerships can provide agencies and organizations with expertise and skills that they might be lacking. For example, if an agency or organization is seeking to update their interpretive signs, but they do not have a graphic designer on staff, they could partner with universities that have students who specialize in art and design.

The benefits of partnerships are numerous, but to build a successful partnership, agencies and organizations must first consider how to identify traditional and non-traditional partners and work with them effectively through intentional communications and relationship-building. There are many existing guides that outline these considerations. The image above highlights two guides that focus on developing partnerships for conservation initiatives.

COVID-19 CONSIDERATIONS
At the time this guide is being written (Spring 2021) we are in the second year of the COVID-19 pandemic. This pandemic has led to additional challenges for shorebird disturbance management, such as more people using beaches for safer outside activities, volunteer or intern programs being reduced or shut down, and added considerations when doing outreach. Here we provide an overview of ways sites are minimizing the risk associated with their community engagement efforts or otherwise adapting their approaches to this newly salient issue.

Any efforts should comply with local, state, and/or federal social/physical distancing guidelines and ensure minimized risk for staff, volunteers, and community members they interact with. This may include providing volunteers and staff with COVID-19 related personal-protective equipment (PPE) such as masks and hand sanitizer, as well training on how to minimize risk.

The best way to minimize risk is to create remote campaigns to minimize physical contact. Examples of how to remotely implement strategies include:

**Communication:** Enhance your agency or organizations’ digital presence.
- Have staff virtually available through innovative and contemporary social media features such as Instagram Live.
○ Share messages related to distancing via social media platforms such as Twitter, Instagram, and Facebook.
○ Apply the concept of social distancing to protect shorebirds as well as people.

**Incentives:** Provide to-go swag bags for dog walkers.
○ To-go swag bags can be given out at visitor centers (if open), veterinarian offices, or pets stores. The bags can include a list/map of local dog walking areas that are alternatives to high-use shorebird beaches as well as items that dog walkers would enjoy such as dog leashes, toys for dog walkers, or bandanas for dogs.

**Norms:** Enhance the visibility of norm-based messages.
○ Items in swag bags can also have norm-based messages or slogans related to leashing dogs near shorebirds.
○ Social media platforms such as Facebook, Instagram, and Twitter can be used to share norm-based messages.

**Commitment:** Conduct online pledge campaigns.
○ Use online platforms to ask beach recreationists to commit to walking around shorebird flocks and/or leashing dogs near shorebirds. As a reward for signing the pledge, organizations and agencies can mail incentive items to participants. Incentive items can have norm-based messages (see norms).

**Prompts:** Remind beach users to leash dogs near shorebirds or walk around flocks.
○ Signs with prompt messages can be posted at beach entrances. QR codes on the signs can direct beach users to an online pledge campaign (see commitment).
Implementation Plan

Building on the case studies provided in this plan, we recommend that these strategies be implemented and results tracked. For a thorough test of the effectiveness of CBSM campaigns, we suggest they be piloted at sites with relatively high and relatively low levels of human and dog use across the Atlantic Flyway of the US. Each pilot site should implement at least 2-3 strategies as part of their campaign to ensure a comprehensive campaign. The pilot sites should each be paired with a control site in the same region with a similarly high or low level of human and dog use. At the control sites no strategies will be implemented. By working at sites where biological data was collected in phases 1 and 2, we will additionally have pre-implementation data for comparisons.

As part of the piloting, an online toolkit of resources for sites implementing these strategies should be developed. It should include Appendix A: Existing Resources, which includes “Existing Resources for Implementing Strategies” as well as new resources, as suggested in the section “Resources Needed for Implementing Strategies.” The “Resources Needed for Implementing Strategies” below may be adapted as sites begin piloting to reflect the needs they experience. Further, all of these Resources should be archived in the AFSI Outreach Database (see callout box) for easy access and searchability. We recommend that the utility of this database could be enhanced for those working on CBSM campaigns if the outreach types tags aligned with CBSM strategies.

Additionally, a community of practice should be developed. A community of practice is a group of “people who share a concern or a passion for something they do and learn how to do it better as they interact regularly” (Wenger-Trayner & Wenger-Trayner, 2015). The community of practice can be fostered by the AFSI online platform (see callout box). In year 1, the sites piloting the strategies should meet remotely on a monthly basis to share lessons learned, support each other in trouble-shooting, and to work with the AFSI Human Activities Committee to inform resource development to support implementation. Beyond year 1, it should be determined if this community of practice via remote meetings should continue to support new sites implementing these strategies. Or, the AFSI Human Activities Committee may provide the appropriate forum for such sharing.

Resources Needed for Implementing Strategies

Resources Needed for Implementing Dog Walking Strategies

General resource (not strategy-specific)
- A decision tree for deciding which strategy or zoning
- Guidance on how to create and present a marketing pitch for local governments
- Information/guidance on working with law enforcement
  - How to train law enforcement
  - Signage requirements for different ownership scenarios
  - How to ask/request law enforcement presence

Communication
- Guidelines for creating and distributing lists/maps of local dog walking areas
Social Norms
- Example list of bark ranger gear

Commitment
- Signs with different pledge phrases or pledge hashtags

Prompts
- Signs with prompts reminding dog walkers to leashing near shorebirds

Incentives
- Example incentive list with ideas

Convenience
- Pre-designed social media posts to alert dog walkers about new access points/paths
- Signs to prompt dog walkers to enter the beach at new locations

Resources Needed for Implementing Beach Walking Strategies

General resource (not strategy-specific)
- A decision tree for deciding which strategy or zoning
- Guidance on how to create and present a marketing pitch for local governments
- Information/guidance on working with law enforcement
  - How to train law enforcement
  - Signage requirements for different ownership scenarios
  - How to ask/request law enforcement presence

Social norms
- Standard building plans for basic viewing blinds
- Information on obtaining building permits
- Information on potential environmental assessments needed

Commitment
- An online platform for hosting pledge campaigns
- A pledge campaign

Prompts
- Signs with a prompt messages related to walking around shorebird flocks

Incentives
- Incentive items with a universal logo that can be recognized at sites across the Flyway

Convenience
- Pre-designed social media posts to alert beach walkers about new access points/paths
- Signs to prompt beach walkers to enter the beach at new locations
AFSI developed a searchable **Shorebird Outreach Resource Directory** that includes brochures, signs, campaigns, stewardship manuals, posters, stickers, etc. for sharing throughout the shorebird community. The database is searchable by focal species, outreach type, and key issues such as dog, disturbance or harassment, and beach use. Many of the materials in the database are available for downloading, sharing, and may be modified for an individual organization’s use.

Partners may submit their materials to be available in the database by entering information on the **Submit Outreach Material** page. After following a few simple steps and uploading associated documents and web links, the AFSI Outreach Database manager will approve submissions for availability in the database.
DEVELOPING A COMMUNITY OF PRACTICE

Shorebird practitioners often want to communicate with their peers to share ideas, resources, ask for feedback, or get help understanding a management issue. In response to this need, the Shorebird Forum for the Americas was developed. This forum was envisioned by the U.S. Shorebird Conservation Partnership and the USA-Committee of the Western Hemisphere Shorebird Reserve Network (WHSRN), and is managed by the Atlantic Flyway Shorebird Initiative, Manomet’s Shorebird Recovery Program, and the Western Hemisphere Shorebird Reserve Network Executive Office.

To participate you simply register your email and subscribe to as many forum topics that you are interested in (e.g., Climate Change; Engagement; Good Governance; Habitat Management; Human Well-being; Monitoring; Shorebird Festivals; and Shorebird Identification Help). Registered participants can start a new topic with an existing forum to engage with other shorebird practitioners throughout the flyway.
MONITORING PLAN

In this document, we outline a CBSM approach to reduce human disturbance based on the latest biological and social science data. CBSM has been successfully used in a variety of environmental contexts (Kennedy, 2010). The CBSM approach has rarely been used to address issues related to shorebird conservation, so there is a need for future monitoring efforts. Specifically, future monitoring should assess if the CBSM approach is effective at changing human activity levels that may disturb shorebirds. Monitoring should also evaluate if changes in human activity levels have a positive impact on shorebird presence and behavior. A standardized protocol to measure these metrics can be found in the Atlantic Flyway Disturbance Report: Biological Data Interim Report (see Appendix A: Atlantic Flyway Disturbance Project Standard Operating Procedures and Datasheets). Ideally, sites would implement surveys before and during/after a campaign and at control and intervention sites. It should be noted that behavior change can be a gradual process so changes in disturbance levels and shorebird response may not be immediately apparent.

In addition to monitoring changes in shorebird disturbance levels, we recommend researchers also evaluate the effectiveness of strategies from a social science standpoint. Specifically, for a campaign aimed at promoting leashing, we recommend managers use a survey to assess changes in peoples’ perceived benefits and constraints to leashing as well as norms. For campaigns aimed at encouraging beach recreationists to walk around flocks, we recommend that managers use a survey to assess perceived benefits and constraints, norms, attitudes about shorebirds, knowledge about shorebirds, and skills related to recognizing shorebirds. The surveys used to inform this document could be adapted for this purpose (see Comber & Dayer, 2021b). Ideally, these surveys would be implemented before and during/after a campaign and at control and intervention sites. The surveys would need to be implemented in similar seasons before and during/after to ensure a similar mix of locals and vacationers. When assessing the effectiveness of a campaign, it is important to recognize that behavior change may not be immediately detectable because changing attitudes and norms can be a slow process (e.g., Comber & Dayer, 2019c). To account for this challenge, evaluations might need to be conducted over an extended period of time. After conducting an evaluation, managers should adapt their strategies based on the evaluation results. If the evaluation shows that the strategies are successful, they can be implemented more broadly.

Additionally, tracking the experiences of the managers and biologist who are utilizing CBSM can allow for rich insights on how to improve the strategies and monitoring efforts, and it can show what tools would be useful for implementing effective campaigns. Both quantitative or qualitative insights should provide feedback to improve the recommendations in this document and CBSM strategies applied at future sites.
APPENDIX A: EXISTING RESOURCES

EXISTING RESOURCES AVAILABLE THROUGH AFSI

Universal Sign Campaign

A unified signage/branding campaign was a priority action identified in the Piping Plover Communication Strategy for Reducing Human Disturbance and the Atlantic Flyway Shorebird Initiative Business Plan. Signs can be an effective way of changing behavior. The plover communication strategy recommended this approach to help address disturbance from beach-going and dog-walking and to increase public recognition of sensitive bird areas using consistent signage.

This project aims to reduce disturbance by showing beach visitors that the beach they are visiting is in fact a home to beach birds like Piping Plover, American Oystercatcher, and Red Knot. The goal is to raise awareness of how the beach they are visiting is a habitat for shorebirds that provides a place to rest, nest, feed, mate, and raise young. With a broader understanding that a beach is a bird’s home, we hope that visitors can learn to “Share the Shore” with species that need it for nesting, foraging, and feeding. Which in turn, increases likelihood of survival. The sign content was informed by research conducted by Comber and Dayer (2019; 2021) on the benefits and constraints to walking around shorebird flocks and leashing dogs on beaches. For example, the phrase “dogs and people frighten beach birds,” is used to reduce the constraint “I don’t know why I would need to walk around flocks.” Whereas the benefit of walking around flocks to reduce disturbance of resting and foraging shorebirds is emphasized by the phrase “give the birds space so they can fuel up and rest.”

Signs were developed through a State of the Birds Grant awarded by the U.S. Fish & Wildlife Service. Hundreds of signs were made and distributed at sites throughout the Atlantic Flyway from Canada to Argentina.

Animated Videos Addressing Human Disturbance

To enhance the Universal Sign campaign, AFSI has developed three animated videos addressing general disturbance to beach birds and disturbance by dogs. The three videos feature a multi-cultural family and are available in Spanish and English, as well as being closed captioned. The videos are available for use and distribution to our partners from the Share the Shore web page.

Hundreds of these universal signs have been distributed to partners throughout the Atlantic Flyway. AFSI

This family will help others understand how they can be good stewards to beach birds. AFSI
EXISTING RESOURCES FOR IMPLEMENTING STRATEGIES

**Existing Resources for Dog Walking Strategies**

**General resource (not strategy-specific)**
- Informational handout about shorebirds and regulations for law enforcement
- Social media guidance for managing disturbance
- Animated videos addressing human disturbance ([English version](#)/[Spanish version](#))

**Communication - Community Outreach**
- Guidance on how to coordinate volunteers
  - Audubon Coastal Bird Toolkit (p. 20-31)
- Forms for volunteer coordinators (e.g., training checklist, strategy for communicating with volunteers, volunteer information form, and emergency contact card for volunteers)
  - Audubon Coastal Bird Toolkit (p. 49-52)
- Example training presentations for volunteers
  - South Carolina steward training presentation
- Volunteer training guide/steward manuals
  - Piping Plover Volunteer Training Guide
  - Audubon Florida Bird Steward Manual
  - Audubon Coastal Bird Toolkit: Section 4 (p. 33-37)
- Training on how to develop and lead guided walks
  - Ham (1992), Chapter 5
- General background information about shorebirds and disturbance (for volunteers)
  - Audubon Coastal Bird Toolkit (p. 4-12)
- Example informational handouts about the impacts of dogs on shorebirds and why it is important to leash dogs on beaches
  - New York Audubon handout
  - Eco Dog Beach Guide, Santa Barbra, California
  - Dogs on the Beach, Ventura County, CA
  - Bird Friendly Beaches Have Dogs on Leashes

**Communication - Interpretation (Information Stations)**
- Guidance on how to coordinate volunteers
  - Audubon Coastal Bird Toolkit (p. 20-31)
- Forms for volunteer coordinators (e.g., training checklist, strategy for communicating with volunteers, volunteer information form, and emergency contact card for volunteers)
  - Audubon Coastal Bird Toolkit (p. 49-52)
- Example training presentations for volunteers
  - South Carolina steward training presentation
- Volunteer training guide/steward manuals
  - Piping Plover Volunteer Training Guide
  - Audubon Florida Bird Steward Manual
  - Audubon Coastal Bird Toolkit: Section 4 (p. 33-37)
- General background information about shorebirds and disturbance (for volunteers)
  - Audubon Coastal Bird Toolkit (p. 4-12)
Guide to Address Beach Walking & Dog Disturbance Along the Atlantic Flyway

- Example informational handouts about the impacts of dogs on shorebirds and why it is important to leash dogs on beaches
  - New York Audubon handout
  - Eco Dog Beach Guide, Santa Barbra, California
  - Dogs on the Beach, Ventura County, CA
  - Bird Friendly Beaches Have Dogs on Leashes

Communication - Interpretation (Signs)
- Guidelines on how to build partnerships (with graphic designers)
  - See “Creating Partnerships”
- Universal signs about leashing dogs near shorebirds

Social Norms
- Guidance on how to coordinate volunteers
  - Audubon Coastal Bird Toolkit (p. 20-31)
- Forms for volunteer coordinators (e.g., training checklist, strategy for communicating with volunteers, volunteer information form, and emergency contact card for volunteers)
  - Audubon Coastal Bird Toolkit (p. 49-52)
- BARK Ranger program materials for coordinators
  - Add to AFSI SITE
- Example training presentations for volunteers
  - South Carolina steward training presentation
- Volunteer training guide/steward manuals
  - Piping Plover Volunteer Training Guide
  - Audubon Florida Bird Steward Manual
  - Audubon Coastal Bird Toolkit: Section 4 (p. 33-37)
- General background information about shorebirds and disturbance (for volunteers)
  - Audubon Coastal Bird Toolkit (p. 4-12)

Commitment
- Guidance on how to coordinate volunteers
  - Audubon Coastal Bird Toolkit (p. 20-31)
- Forms for volunteer coordinators (e.g., training checklist, strategy for communicating with volunteers, volunteer information form, and emergency contact card for volunteers)
  - Audubon Coastal Bird Toolkit (p. 49-52)
- Example training presentations for volunteers
  - South Carolina steward training presentation
- Volunteer training guide/steward manuals
  - Piping Plover Volunteer Training Guide
  - Audubon Florida Bird Steward Manual
  - Audubon Coastal Bird Toolkit: Section 4 (p. 33-37)
- General background information about shorebirds and disturbance (for volunteers)
  - Audubon Coastal Bird Toolkit (p. 4-12)
- Photo release forms
  - Example photo release forms for adults
  - Example photo release forms for children
- Example pledge form
Prompts
- Guidelines on how to build partnerships (with graphic designers)
  - See “Creating Partnerships”

Incentives
- Guidance on how to coordinate volunteers to procure/hand out incentive items
  - Audubon Coastal Bird Toolkit (p. 20-31)
- Forms for volunteer coordinators (e.g., training checklist, strategy for communicating with volunteers, volunteer information form, and emergency contact card for volunteers)
  - Audubon Coastal Bird Toolkit (p. 49-52)
- Example training presentations for volunteers
  - South Carolina steward training presentation
- Volunteer training guide/steward manuals
  - Piping Plover Volunteer Training Guide
  - Audubon Florida Bird Steward Manual
  - Audubon Coastal Bird Toolkit: Section 4 (p. 33-37)
- General background information about shorebirds and disturbance (for volunteers)
  - Audubon Coastal Bird Toolkit (p. 4-12)

Convenience
*General resources needed for creating footpaths*
- Guide to writing press release statements and example statements
  - How to write a press release
  - How to write an effective press release
  - Writing press releases
- Guidance on placing string/rope fence (along the edge of paths to increase their visibility)
  - Audubon Coastal Bird Toolkit (p. 39-41)

*Existing Resources for Beach Walking Strategies*

*General resources (not strategy-specific)*
- Social media guidance for managing disturbance
- Animated videos addressing human disturbance

*Communication - Community Outreach*
- Guidance on how to coordinate volunteers to procure/hand out incentive items
  - Audubon Coastal Bird Toolkit (p. 20-31)
- Forms for volunteer coordinators (e.g., training checklist, strategy for communicating with volunteers, volunteer information form, and emergency contact card for volunteers)
  - Audubon Coastal Bird Toolkit (p. 49-52)
- Example training presentations for volunteers
  - South Carolina steward training presentation
- Volunteer training guide/steward manuals
  - Piping Plover Volunteer Training Guide
  - Audubon Florida Bird Steward Manual
  - Audubon Coastal Bird Toolkit: Section 4 (p. 33-37)
- General background information about shorebirds and disturbance (for volunteers)
  - Audubon Coastal Bird Toolkit (p. 4-12)
- Training on how to develop and lead guided walks
  - Ham (1992), Chapter 5
• Example informational handouts about the general impacts of beach recreation on shorebirds and ways to reduce disturbance
  o [Audubon guide to sharing the beach with shorebirds](#)
  o [Living with beach-nesting birds](#)
  o [10 things you can do to protect piping plovers](#)
  o [Endangered locals need your help](#)
  o [Share the beach with nesting birds](#)
  o [Share the beach with our wildlife](#)
  o [Children’s activity handouts about sharing the shore](#)

Communication - Interpretation (Signs):

• Guidelines on how to build partnerships (with graphic designers) who can create signs
  o See “Creating Partnerships”
• Universal signs about walking around shorebird flocks and sharing the shore coastal birds
• Resources for working with schools to create original signs for beach stewardship
  o [Audubon Coastal Bird Toolkit (p. 43-44)](#)
  o [How to make share the shore art signs](#)
  o [Kid’s beach sign template](#)
  o [Kid’s beach sign example](#)
• Signs and graphics about where to walk on the beach
  o [Where to walk graphic](#)
  o [Maine shorebird sign](#)

Social norms

• [Guide to creating wildlife viewing blinds](#)
• [Example informational handout about being a responsible shorebird photographer](#)

Commitment

• Guidelines on how to build partnerships with graphic designers who can create signs with signs with a
  QR code
  o See “Creating Partnerships”
• Information on QR codes and how to create them
  o [Guide to QR codes](#)
  o [How do QR codes work](#)
  o [Ten commandments of QR codes](#)

Prompts

• Guidelines on how to build partnerships with graphic designers who can create signs
  o See “Creating Partnerships”

Incentives

• Guidance on how to coordinate volunteers to procure/hand out incentive items
  o [Audubon Coastal Bird Toolkit (p. 20 -31)](#)
• Forms for volunteer coordinators (e.g., training checklist, strategy for communicating with volunteers, volunteer information form, and emergency contact card for volunteers)
  o [Audubon Coastal Bird Toolkit (p. 49-52)](#)
• Example training presentations for volunteers
  o [South Carolina steward training presentation](#)
• Volunteer training guide/steward manuals
  o [Piping Plover Volunteer Training Guide](#)
○ Audubon Florida Bird Steward Manual
○ Audubon Coastal Bird Toolkit: Section 4 (p. 33-37)
● General background information about shorebirds and disturbance (for volunteers)
  ○ Audubon Coastal Bird Toolkit (p. 4-12)

Convenience

General resources needed for creating footpaths
● Guide to writing press release statements and example statements
  ○ How to write a press release
  ○ How to write an effective press release
  ○ Writing press releases
● Guidance on placing string/rope fence (along the edge of paths to increase their visibility)
  ○ Audubon Coastal Bird Toolkit (p. 39-41)

Creating footpaths can direct beach recreationists to areas of the beach that are not used by shorebirds. Photostock
REFERENCES

Everly, J., Comber, C., & Dayer, A. A. (2021). The development and implementation of dog
regulations and closures to protect shorebirds. Virginia Tech.


Harrington, B. A. (2005). *Studies of disturbance to migratory shorebirds with a focus on Delaware Bay during north migration*.


Assessing the effects of human activities on the foraging opportunities of migratory shorebirds in Austral high latitude bays. PLOS One, 14(3), 1–16.


Kinship appeals and conservation social marketing. Biodiversity Conservation, 26,1009-1026.

The effects of disturbance on the abundance and foraging behaviour of shorebirds and waterbirds in the tropical mudflat areas. Sains Malaysiana, 46(3), 365–372.

Exploring the energetic costs of roosting and disturbance around a tropical bay. Biological Conservation, 133(2), 225–235.

Effects of human activity on behavior of breeding American oystercatchers, Cumberland Island National Seashore, Georgia, USA. Waterbirds: The International Journal of Waterbird Biology, 31(1), 70–82.


The early shorebird will catch fewer invertebrates on trampled sandy beaches. PLoS ONE, 11(8), 1–9.


