

Evaluating Disturbance to Migrating and Overwintering Shorebirds in the Caribbean



Photo Credit: Walker Golder

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Table of Contents

Introduction	1
Methods	4
Caribbean Waterbird Census	4
Focus Group	4
Survey	6
Results	7
Focus Group	7
Survey	10
Discussion	21
Literature Cited	25
Appendix A: Focus Group Recruitment Emails	28
Appendix B: Focus Group Script	39
Appendix C: Focus Group codes, code descriptions, and example quotes	45
Appendix D: Survey Recruitment Emails	51
Appendix E: Survey	60

Introduction

Managing human disturbance requires an understanding of the term “disturbance” (Colwell 2010). To better understand the term “disturbance,” in relation to shorebirds, Mengak and Dayer (2020) used the Delphi technique, which is an iterative consensus-building social science method, to bring scientists and managers in the Northeastern United States (U.S.) together to develop a shared definition of human disturbance. Through analyzing open-ended responses, key themes were identified, refined, and ranked. Using the top-ranked themes, Mengak and Dayer (2020) developed the following definition of human disturbance to shorebirds: *“Human disturbance of shorebirds 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.”* In addition to developing a shared definition of human disturbance, Mengak and Dayer (2020) asked participants to list potential human disturbances that affect shorebirds during fall migration. Participants created a list of 94 disturbances, and through rating and ranking tasks, they

reduced the list to 12 priority disturbance categories that represent the perceived most significant human disturbances in the Northeastern United States.

Although Mengak and Dayer's (2020) definition and list of disturbance types provides greater clarity on the topic of disturbance, the definition and list of disturbance types may be influenced by the study's geographic focus on the Northeastern U.S. as it is common for Delphi results to be reflective of the participants selected (Mukherjee et al. 2015). Due to this limitation, Mengak and Dayer (2020) called for future social science efforts to explore the utility of their definition. In this current evaluation, we do just that by examining how well the definition of human disturbance developed by Mengak and Dayer (2020) describes human disturbance to shorebirds, observed in the Caribbean by Caribbean Waterbird Census (CWC) monitors.

The Caribbean is one of seven priority focal areas for shorebird conservation (AFSI 2015), providing key wintering habitat (e.g., Gratto-Trevor et al. 2016) and stopover habitat between continents in the Atlantic Flyway (Cañizares and Reed 2020). Although protecting key stopover habitat along the Atlantic Flyway is a critical component of shorebird conservation (AFSI 2015), the Caribbean is often overlooked in conservation efforts aimed at protecting North American shorebirds (Cañizares and Reed 2020). Recent trends indicate that shorebird populations in the Caribbean are declining (Hunter et al. 2002, Thomas et al. 2006), in part due to human disturbance (Brown et al. 2001).

Human activities in the Caribbean can lead to direct mortality of shorebirds. Vehicles traveling across wetlands in St. Martin were reported to have crushed eggs in three different Wilson's Plover nests (Brown and Brindock 2011). Additionally, direct mortality can result from legal or illegal hunting and trapping. Hunting occurs within several Caribbean islands such as Barbados, Cuba, Guadeloupe, Martinique, Saint Barthélemy, Saint Martin, and Trinidad and Tobago (AFSI Harvest Working Group 2017, Aguilar et al. 2020). Thousands of shorebirds are harvested annually in the Caribbean, including Lesser Yellowlegs (*Tringa flavipes*), Greater Yellowlegs (*Tringa melanoleuca*), American Golden-Plover (*Pluvialis dominica*), Black-bellied Plover (*Pluvialis squatarola*), Whimbrel (*Numenius phaeopus*), sandpipers (Scolopacidae spp.), and others (Wege et al. 2014, Andres 2017). For some species, harvest rates might exceed sustainable limits, which could result in the loss of genetic diversity and lasting ecological and societal impacts (e.g., disruption of ecosystem processes and economic contributions of shorebirds; McDuffie et al. 2022).

Human activities in the Caribbean can also indirectly cause disturbance to shorebirds. Horseback riding, introduced mammals such as domestic dogs (*Canis lupus familiaris*) and domestic cats (*Felis catus*), and traffic from off-road vehicles are believed to be just some of the many anthropogenic factors that led to the decline and subsequent extirpation of Snowy Plover (*Charadrius alexandrinus*) on St. Martin (Brown 2012). Declines throughout the Caribbean have also been attributed to coastal development (Brown et al. 2001). For instance, on the southeast Peninsula of St. Kitts, intense development threatens the breeding grounds of Wilson's Plover (*Charadrius wilsonia*, Brown and Synder 2013). Although some wetlands in the Caribbean have not

been developed, they face other anthropogenic threats such as pollution and land conversion for agriculture (Sorenson and Gerbracht 2014).

The need to monitor and manage human disturbance in the Caribbean is widely recognized by organizations such as BirdsCaribbean (Sorenson and Gerbracht 2014); however, numerous factors make this a challenging task. First, the Caribbean is a geographically diverse region, containing hundreds of islands, with some important shorebird sites being inaccessible or challenging to reach by monitors (Cañizares and Reed 2020). The Caribbean is also composed of dozens of different political institutions with varying regulations, making it difficult to have consistent management efforts across the region (Cañizares and Reed 2020). When coordinated efforts such as the Caribbean Waterbird Census (CWC) are carried out, limited resources (e.g., internet access, trained monitors, and funding) impede data collection and entry efforts, leading to knowledge gaps in shorebird conservation across the region (Sorenson and Gerbracht, 2014).

According to Cañizares and Reed (2020), the lack of attention to shorebird conservation in the Caribbean may be attributed to knowledge gaps about the need for conservation in this region. One approach for reducing knowledge gaps is to elicit expert opinion (Aipaniguly et al. 2003, Halpern et al. 2007). Expert opinion is an essential component of environmental management and can be useful in situations where time and resources are limited, and data are insufficient or lacking (Burgman et al. 2011). Experts can be anyone with relevant and extensive or in-depth experience on a topic, for instance, scientists, managers, members of the public (Krueger et al. 2012), local residents, or resource users (Burgman et al. 2011). Expert opinion, obtained through interviews with coastal land managers, has been successfully used to assess human disturbance management in the United States and Canada portions of the Atlantic Flyway (Comber and Dayer 2021). Eliciting the expert opinion of CWC monitors is a promising approach for identifying knowledge gaps related to human disturbance management in the Caribbean. Moreover, eliciting the expert opinion of CWC monitors can serve as an efficient method for conducting the first step of community-based social marketing (CBSM).

CBSM is a framework used to promote broad, sustainable behaviors within a community and has been piloted in the U.S. to reduce disturbance to shorebirds. CBSM is accomplished through a five-step iterative process where practitioners start by identifying a behavior to promote that has a high level of impact, a high probability of engagement by the target audience, and a low level of penetration. Penetration refers to how many people in a group engage in a behavior. If most people in a group do not engage in a behavior, the behavior is said to have low penetration, and there is room to improve peoples' engagement in the behavior (McKenzie-Mohr 2011). Understanding these characteristics is essential for conducting a successful CBSM campaign. Therefore, we elicited the expert opinion of CWC monitors to identify behaviors that could be used for a future CBSM campaign. Additionally, we will reduce knowledge gaps and enhance the understanding of human disturbance monitoring and management in the Caribbean by addressing the following questions:

1. How well does the definition of human disturbance developed by Mengak and Dayer (2020) compare to human disturbance experienced in the Caribbean?
2. What types of potential human disturbances are faced by shorebirds in the Caribbean?
3. What do monitors perceive to be the greatest threats to shorebirds at their site?
4. What methods are used for monitoring potential human disturbances in the Caribbean?
5. How are potential human disturbances managed at CWC sites?
6. What resources do monitors need in order to protect shorebirds from potential human disturbances?
7. What conservation behaviors do monitors believe recreationists can be encouraged to do in an effort to reduce potential human disturbances to shorebirds?

Methods

Caribbean Waterbird Census

The CWC is a multi-partner, region-wide waterbird and wetland monitoring program led by BirdsCaribbean. The goal of this program is to learn about the distribution, status, and abundance of waterbirds in the Caribbean to better conserve and manage their habitats. The program began in 2010, and involves NGO or government wildlife professionals, scientists, conservationists, or volunteer birdwatchers from across the Caribbean region who use standardized CWC protocols to monitor waterbirds. Each year, during a 3-week period from January 14th to February 3rd, BirdsCaribbean organizes a region-wide coordinated CWC count to gain a 'snapshot' of winter waterbird population numbers and habitat use. However, individuals are encouraged to carry out CWC surveys at Caribbean wetland sites throughout the year. Because CWC monitors make regular visits to Caribbean wetlands, we consider them to have expert knowledge about the threats faced by shorebirds at CWC Sites.

Focus Group

Sample Group

BirdsCaribbean developed a list of individuals to recruit for a focus group. Individuals represented the following islands/countries known to have important wetlands for shorebirds: Antigua & Barbuda, The Bahamas, Turks and Caicos Islands, Puerto Rico, U.S. Virgin Islands, Dominican Republic, Anguilla, Guadeloupe, Cuba, Venezuela (offshore islands), St Martin/ Sint Maarten, Jamaica, and St. Vincent & the Grenadines. Individuals were selected based on their detailed knowledge and experience of wetlands and shorebirds, their level of involvement in CWC surveys, and their likely knowledge of disturbance caused to shorebirds on the islands where they work.

Recruitment

We used email to recruit individuals for a virtual focus group (see Appendix A). We sent all emails in English, Spanish, French, and Dutch. In the first email, we provided a link for an online poll to determine a date and time for the focus group discussion. Due to low response and limited availability of CWC monitors, we created a new poll with additional dates and times and sent the new poll in a second email. A third email was sent with the final date and time of the focus group, the Zoom link to access the virtual meeting, and a table with potential human disturbances (adapted from SM Table 1 in Mengak and Dayer 2020) for the CWC monitors to review before the meeting. We also included information about compensation in the form of a \$50 Amazon gift card for participating in the focus group.

Implementation

The focus group meeting took place virtually, using Zoom (version 5.12.9) and was audio recorded. The meeting lasted 90 minutes and was facilitated by two project investigators from Virginia Tech. The project investigators used a pre-written script (Appendix B) that was reviewed by co-authors from BirdsCaribbean. The script was designed to understand: 1) how well the definition of human disturbance developed by Mengak and Dayer (2020) compares to human disturbance experienced in the Caribbean; 2) the types of potential human disturbances faced by shorebirds in the Caribbean; 3) methods used for monitoring potential human disturbances in the Caribbean; 4) resources needed to monitor potential human disturbances; and 5) conservation behaviors that monitors believe recreationists can be encouraged to do in an effort to reduce potential human disturbances. To understand the types of disturbances faced by shorebirds in the Caribbean, we created a table of potential human disturbances adapted from the list of disturbances developed by Mengak and Dayer (2020). We distributed the table to participants prior to the meeting (See Appendix B). The meeting was conducted in English, with closed captions in Spanish. We also provided pre-written questions in Spanish via the chat feature in Zoom. Additionally, a participant who spoke both Spanish and English provided assistance by translating questions and comments as needed throughout the discussion.

Analysis

We reviewed the audio-recorded transcript from Zoom to ensure that it accurately matched the audio recording. We qualitatively analyzed the transcript using Dedoose (Version 9.09.90). We created a codebook (see Appendix C) using predetermined codes based on our primary questions (i.e., deductive approach) and added codes when additional topics emerged (i.e., inductive approach; Gale et al., 2013). After we completed the first iteration of coding, we conducted two additional iterations to ensure that added codes were reflected throughout the entire transcript.

Survey

Sampling Frame

BirdsCaribbean co-authors developed a list of individuals who were eligible to take the survey. CWC data from eBird (dating from 2010 – 2023) were used to create a list of sites within the top 20% by shorebird abundance and shorebird diversity for each country/island ($n = 356$). For these sites, there were 587 unique eBird user IDs who had visited sites to take part in CWC monitoring at least once. From this list, we selected the most appropriate individuals to send the survey to based on experience as a monitor, number of visits to sites, and recency of visits. We removed eBird user IDs that were from survey coordinators (i.e., individuals who did not conduct surveys in person), observers who passed away, and observers who were no longer working at a CWC site. Based on the selection criteria, there were 250 eligible CWC monitors.

Recruitment

We recruited eligible CWC monitors via email (Appendix D) and provided them with a link to take the survey (Appendix E). After sending the initial recruitment email, we sent four follow up email reminders to eligible individuals who did not complete the survey. All emails were provided in English, Spanish, and French.

Implementation

The survey was administered online through QuestionPro v.1.0.0. The survey was active from June 12, 2023 to July 05, 2023. The survey sought to understand 1) the current practices and techniques used to manage and monitor potential human disturbances to shorebirds at CWC sites in the Caribbean; 2) resources needed to manage and monitor potential human disturbances at CWC sites; 3) CWC monitors' perceptions of public response to management practices; 4) CWC monitors' perceptions of conservation behaviors that could reduce potential human disturbances through a community-based social marketing campaign; and 5) CWC monitors' perceptions of threats to shorebirds at CWC sites in the Caribbean. Survey items and response options were informed by data collected during the focus group, the CWC site and data forms, and survey items from Comber and Dayer (2021). The survey questions were primarily close-ended, consisting of a 5-point Likert scale, and check-all-that-apply items. CWC monitors also had the opportunity to enter text in open-ended questions and in questions that had "other" listed as a response option.

Analysis

We analyzed data for descriptive statistics using SPSS. Results are presented with "CWC monitors" as the unit of analysis.

Results

Focus Group

Sample Group

Some monitors who we initially contacted were not able to participate due to time constraints and political restrictions that limited their ability to use Zoom. Of the fifteen monitors contacted, nine participated in the focus group discussion. One monitor was present from each of the following seven countries: Trinidad and Tobago, Puerto Rico, Dominican Republic, Guadalupe, Bahamas, Antigua and Barbuda, and Venezuela. Two monitors from Turks and Caicos Islands were present.

Human Disturbance Definition

CWC monitors felt that the definition of human disturbance developed by Mengak and Dayer (2020) was an accurate representation of human disturbance in the Caribbean and did not have any disagreement with the definition. When asked if there was anything to add or remove, CWC monitors noted that using the term “anthropogenic” might be more inclusive of all the human-induced disturbance types faced in the Caribbean, such as disturbance from feral animals, pets, domestic animals, and introduced exotic species. One monitor noted:

I feel like as long as we have some sort of cover-all for things that humans are causing maybe indirectly, so it's not the actual people, it's things like feral dogs or introduced things. Cause it's not just dogs, I think it's cats and other things. And introduced predators, um, and litter. You know, all the things that humans might do to impact the wetland system. So as long as that's clear in the definition that it's not just humans directly, I think that's a good cover-all.

Based on the focus group feedback, we revised the definition by Mengak and Dayer (2020) by adding the terms “anthropogenic” and “human-induced” as shown below.

Human disturbance of shorebirds is an **anthropogenic, human-induced**, or 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.

Disturbance Types

The table (see Appendix B) of potential human disturbances included many disturbance types that CWC monitors have witnessed in the Caribbean. Suggestions for improving the table mostly focused on being more inclusive to language used in all countries by adding additional terms that capture the same disturbance type. For example, the table included salt-picking, but monitors noted that the activity “salt-picking” can be called different names in different countries. Other suggestions to revise the table included adding and/or removing disturbance types that may not occur at particular locations. For example, some monitors suggested removing ATVs or 4x4 vehicles because these disturbance types did not occur at their CWC site. However, the monitors eventually agreed that it is important to include all the disturbance types to capture the full extent of disturbance across the region. A monitor explained this by saying:

If the survey is gonna be used throughout all the region, it's better to have all the disturbances. Some islands may not have some of these disturbances, but others may, like ATVs, so maybe it's better to have them all.

And another monitor agreed by adding:

Yeah, I was just gonna say in [site name], the sites that I'm monitoring are mainly mud flats, so they're not recreational areas and they're not beaches. Um, so obviously there's a huge selection of these things that don't apply to those sites, but yeah, I imagine they would apply to other places that people might be monitoring.

Lastly, monitors added disturbance types to the table that were not disturbance issues in the United States according to SM Table 1 in Mengak and Dayer 2020. In particular, monitors noted that illegal dumping of trash is a major problem at CWC sites.

Every year we have to keep going and cleaning up and we're like removing tons of garbage and every year there's still more. So it's to the point where we need something to stop this illegal dumping program and it's in every single one of the wetlands that we, um, survey.

Methods for Monitoring Potential Human Disturbances

Methods for monitoring potential human disturbances varied across sites. Some monitors noted that they use systematic protocols such as the CWC site description form to describe disturbance. However, monitors explained that when they enter their CWC data into eBird, they do not have a standard way to describe disturbance events. Many monitors also described informal approaches to monitoring. At one site, the lead monitor noted that newer monitors are less skilled at identifying disturbance types and lack a sense for characterizing disturbance levels, which can make it challenging to monitor disturbance. To standardize the process, the lead monitor has novice monitors think about disturbance from the perspective of shorebirds and characterize the level of disturbance on a scale from low to high. The lead monitor explained this by saying:

That's what I was trying to get them to think about. Yeah. You know, if you were to think like a bird, you know, if you were a bird, would that thing happening over there bother you? Look at the birds, look at what they're doing, are they bothered? You know, and just try and get them into the mindset to start thinking about sites in that sense. That was the way I approached it. Did it work? I don't know. It's a work in progress. We'll see in 20 year's time or something. But, um, it, it's just, it's, it's tricky.

Resources Needed by CWC Monitors

Monitors described several resources that could assist them with monitoring potential human disturbances. The need for funding was expressed by monitors as they explained the ways that they are limited in their management efforts, for example, not being able to have big education campaigns due to the associated cost. Physical resources (i.e., equipment and supplies) were also mentioned as a resource needed by several monitors. One monitor said that having trail cameras could help monitor illegal dumping at their site. Another monitor added that signs would help at their site, although disagreement about the effectiveness of signs was raised by a monitor who had signs stolen from their site. Other monitors mentioned that having training on how to interact and work with other entities such as enforcers would improve human disturbance monitoring and management:

I think that one thing that really needs to happen to us to curb this illegal dumping and stuff like that is we are going to need to reach out to the enforcers...for the general public, it's the enforcers and the persons who write the legislation that we really need to get in contact with. Because a lot of times, at least in [site name], they aren't really aware of the scope of the issue and they don't really know much about the, the wildlife and how important the wildlife is for the, for ecotourism, that kind of thing.

Although improving relationships with enforcers was suggested by some monitors, others expressed the difficult nature of such a task.

Yeah, it's not like a matter of talking. It is that these people [referring to business owners] are not committed to environmental protection. So they're looking for their own profit from these businesses of having ATVs on the shore. And everything is so political that if the owners of these businesses are friends to the... politicians, they are never gonna change anything.

Pro-Environmental Behaviors

Due to limited time and language barriers, we were not able to identify pro-environmental behaviors that recreationists could take to reduce potential human disturbances to shorebirds. However, while discussing resource needs, many monitors talked about the importance of education at the community level as an avenue for reducing disturbance. Although education could be a route for changing behavior, underlying constraints related to poverty were mentioned as drivers for some potential human disturbances (i.e., salt harvest or recreational ATV use). One monitor described the situation at their site:

[It's a] very difficult situation right now. And people need profit to live, so there are no concern about saving the birds. They're just needing money at this moment to survive. So this is something, well, we have this kind of problems in all the Caribbean, but [site name] is most difficult at the moment.

Despite the economic challenges associated with reducing potential human disturbances, monitors felt that continuing to engage local communities and include them in conservation initiatives at the local level would be the best approach for reducing disturbances to shorebirds.

There are many problems, but we, but what we are working on, and would like to continue working on is to link more communities, more people from the communities that live there.

Survey

Sample

We emailed recruitment messages to 223 individuals who were eligible to take the survey. After receiving the recruitment emails, 119 individuals opened the survey link. As individuals took the survey, some dropped out at various points. For the data analysis, we removed responses if the individual dropped out of the survey at the first question ($n = 29$). We also removed responses where the individual did not indicate a specific site name (e.g., they gave a country or island name; $n = 4$). Lastly, we removed responses that were submitted for the same site name ($n = 17$) so that sites were not duplicated in the analysis. When surveys were submitted for the same site, we selected

the first fully submitted survey to include in the analysis. After removing the aforementioned responses, we had 69 valid responses for the analysis, making our response rate 30.9%. CWC monitors who took the survey represented the following islands/countries: Antigua and Barbuda ($n = 1$), Aruba ($n = 2$), The Bahamas ($n = 7$), Barbados ($n = 5$), Bonaire ($n = 2$), Cayman Islands ($n = 5$), Cuba ($n = 3$), Curaçao ($n = 1$), Dominica ($n = 1$), Dominican Republic ($n = 2$), Grenada ($n = 1$), Guadeloupe ($n = 2$), Haiti ($n = 6$), Martinique ($n = 1$), Montserrat ($n = 1$), Puerto Rico ($n = 10$), Saint Lucia ($n = 1$), Saint Vincent and the Grenadines ($n = 1$), Sint Maarten/Saint, Martin ($n = 1$), Trinidad and Tobago ($n = 7$), Turks and Caicos Islands ($n = 2$), Venezuela ($n = 4$), and U.S. Virgin Islands ($n = 3$).

Characteristics of CWC Monitor's sites

Most individuals reported that there were no staff present at the CWC sites that they monitor and/or manage (Figure 1). The most common habitat categories at their CWC sites were: 1) sandy beach, berm, shoreline and 2) marine (coral reef, seagrass bed, open sea, bay, strait; Figure 2). The top five species that were present at the selected sites annually at some point during the year were: Lesser Yellowlegs, Spotted Sandpiper (*Actitis macularius*), Greater Yellowlegs, Ruddy Turnstone (*Arenaria interpres*) and Least Sandpiper, Figure 3).

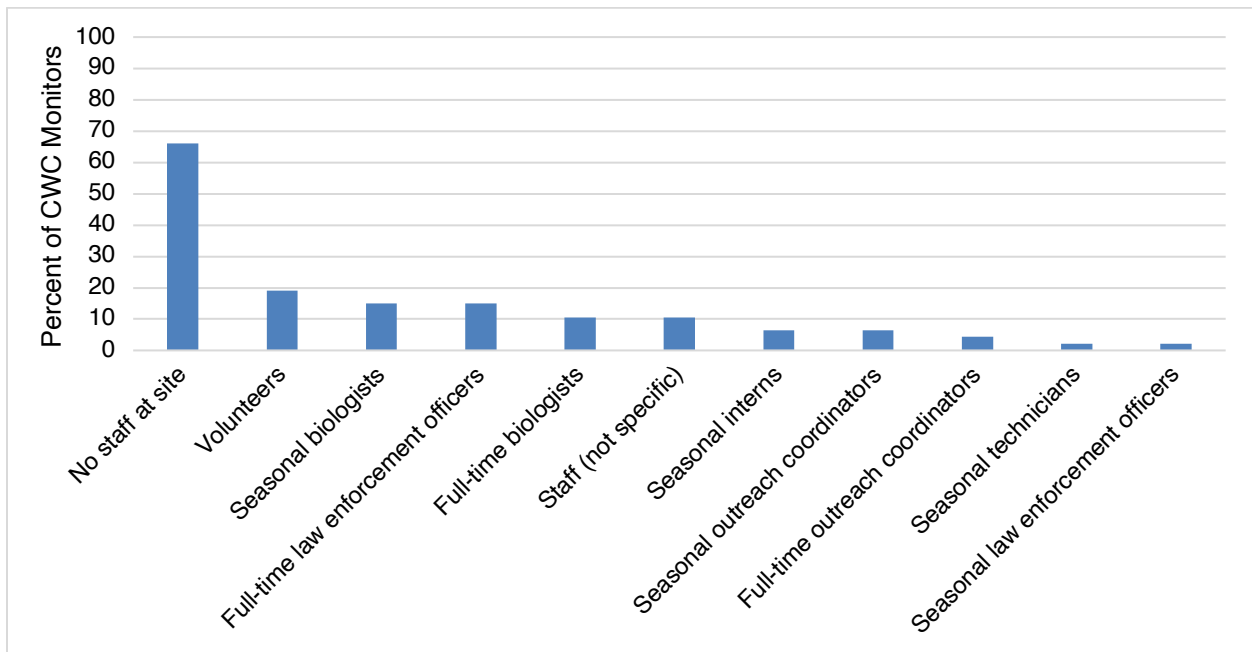


Figure 1. The percent of CWC monitors ($n = 47$) who reported types of staff at a CWC site that they monitor and/or manage.

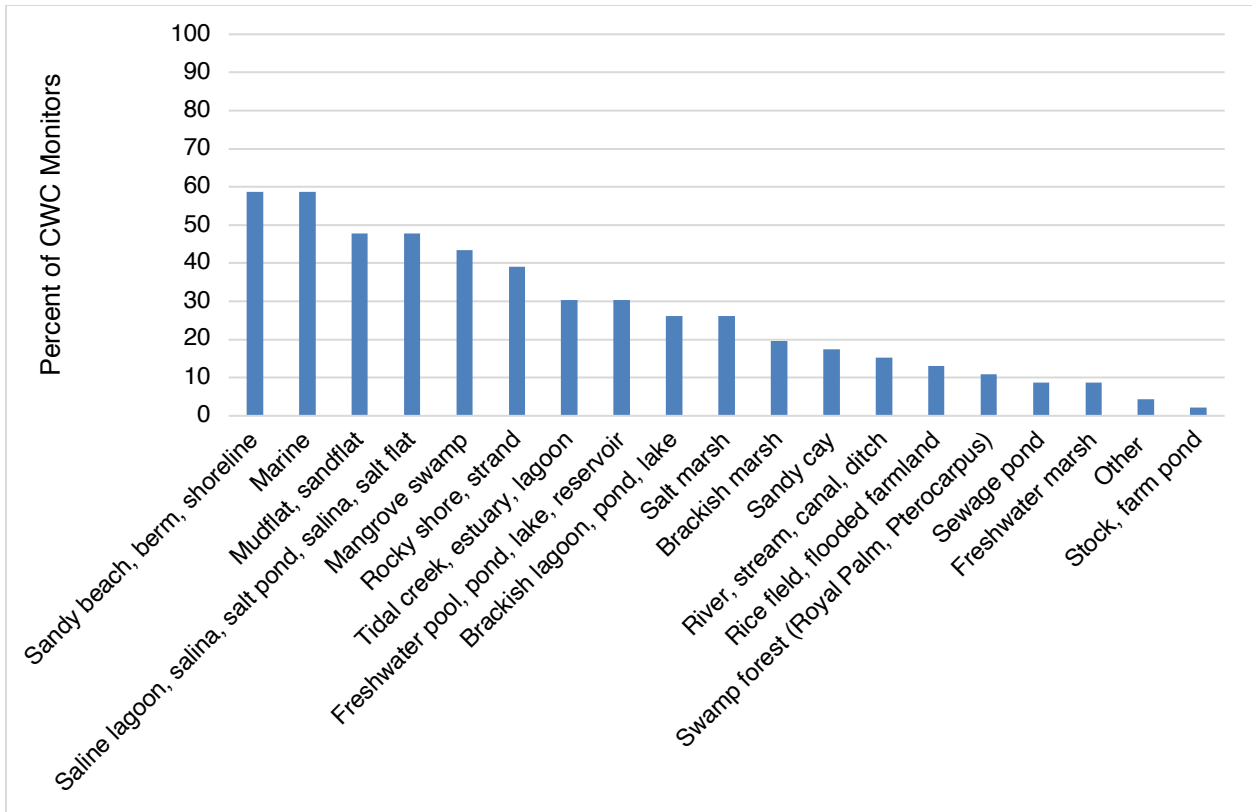


Figure 2. The percent of CWC monitors ($n = 46$) who reported habitat types present at CWC sites that they monitor and/or manage.

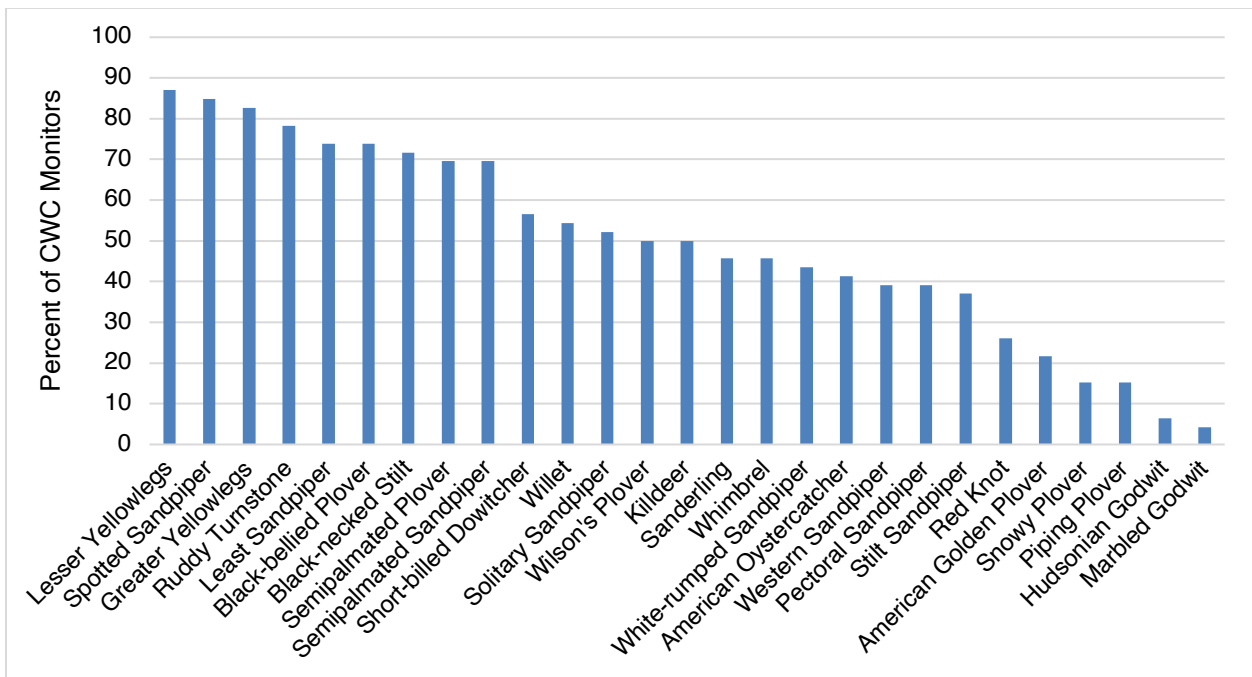


Figure 3. The percent of CWC monitors ($n = 46$) who reported species present at some point during the year on an annual basis at a CWC site that they monitor and/or manage.

Threat Rank

CWC monitors were asked to rank a variety of threats (adapted from the CWC site form) at their site, with 12 being the greatest threat. If a threat was not present, CWC monitors were instructed not to rank that threat. From the mean rank, it was determined that human disturbance was the greatest threat that monitors perceived at their site (Figure 4).

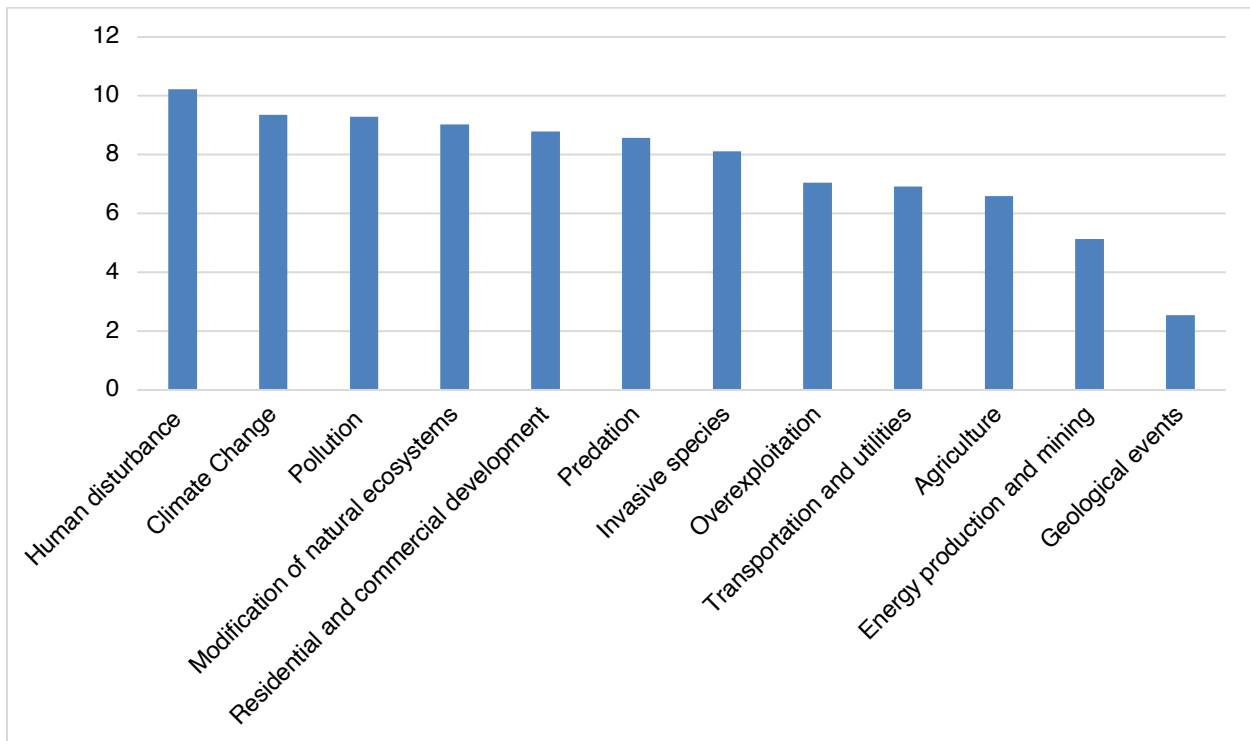


Figure 4. The average rank of CWC monitors' perceptions of the greatest threats to shorebirds at their site with 12 being the greatest threat.

Disturbance Types

CWC monitors noted that the top legal and/or illegal potential human disturbances present at their sites are dogs (70.7%), dumping (65.2%), and wildlife observation (60.3%; Figure 5). Of the CWC monitors who have potential human disturbances present at their sites, most reported that there are no restrictions on the activities (Figure 6). The most commonly restricted activity is hunting, but only at 40% of the sites with hunting activity present. At sites that do have restrictions, CWC monitors noted that the public is most compliant with restrictions related to wildlife observation, manned aircraft, and beach raking. CWC monitors reported that the public is least compliant with restrictions related to dogs, cats, and dumping (Figure 7).

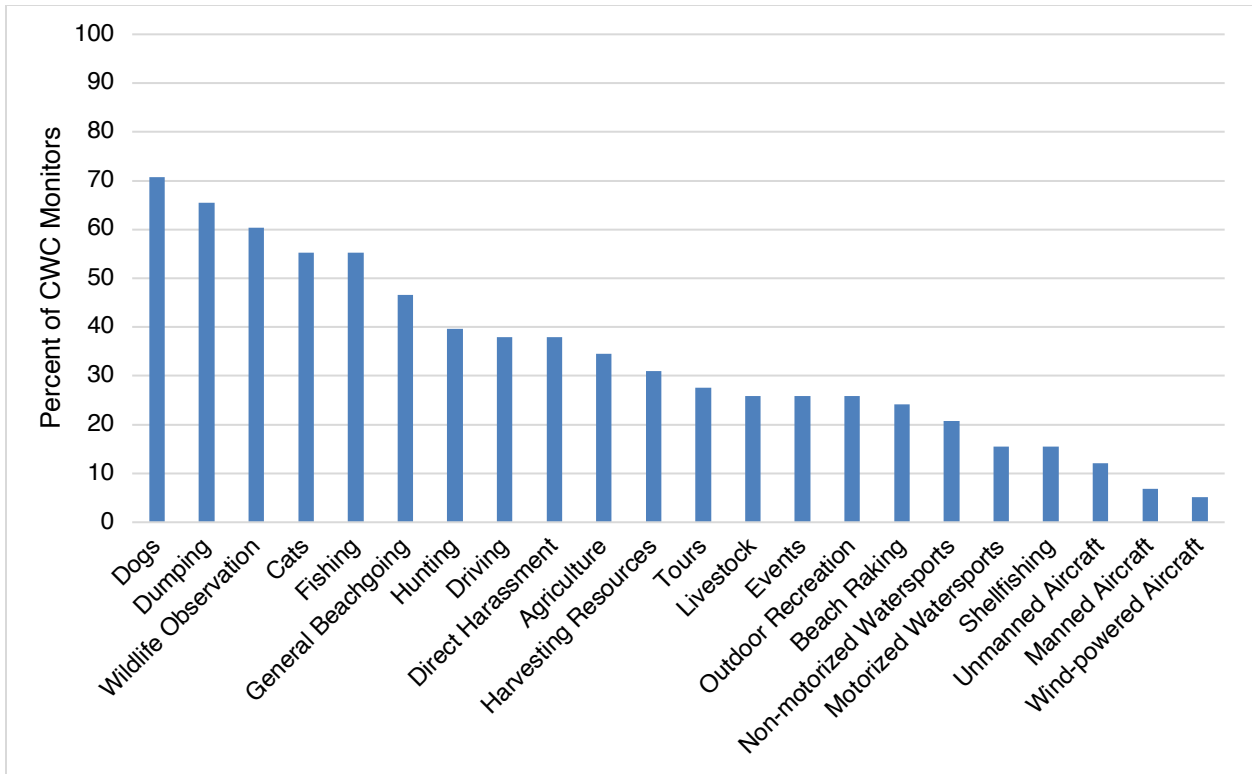


Figure 5. The percent of CWC monitors ($n = 58$) who indicated legal or illegal potential human disturbances within the last five years at a CWC site that they monitor and/or manage.

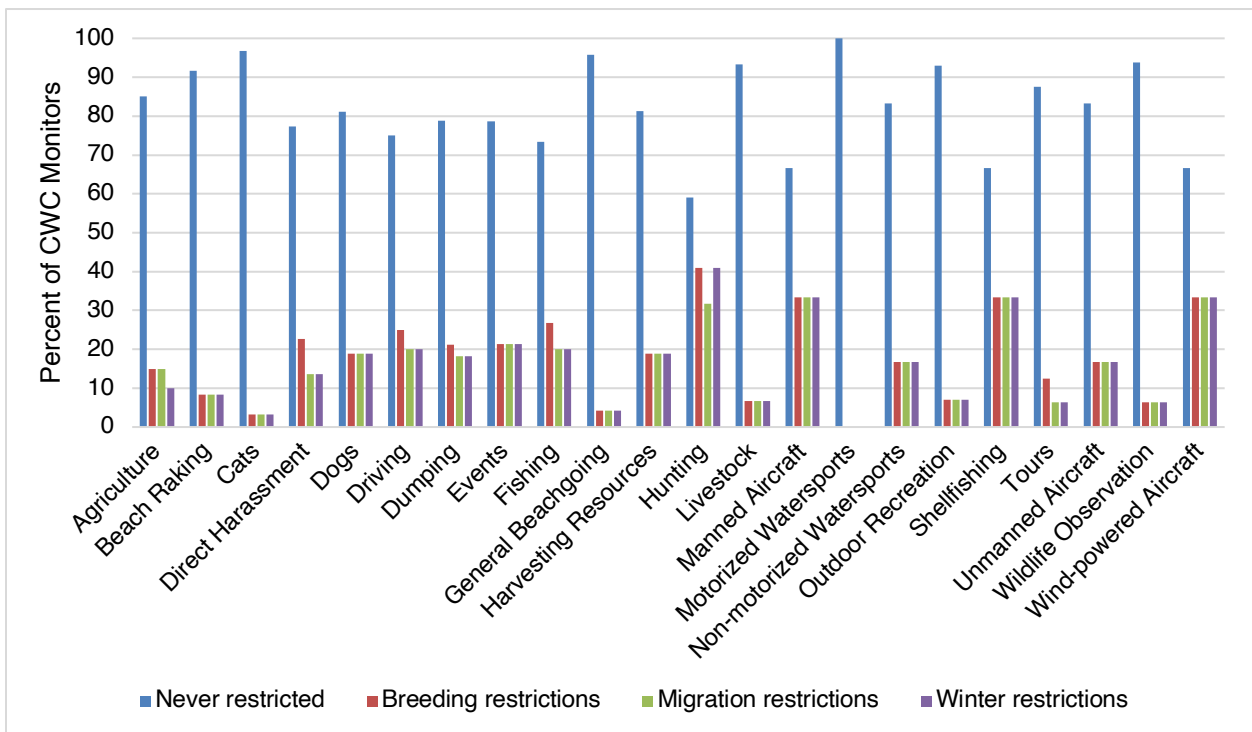


Figure 6. The percent of CWC monitors ($n = 58$) who reported restrictions on disturbance types during the breeding, migration, and/or winter seasons at a CWC site that they monitor and/or manage. Only individuals who had disturbance types present at their site reported restrictions, therefore the number of individuals who responded for each disturbance type ranged from 3 – 41.

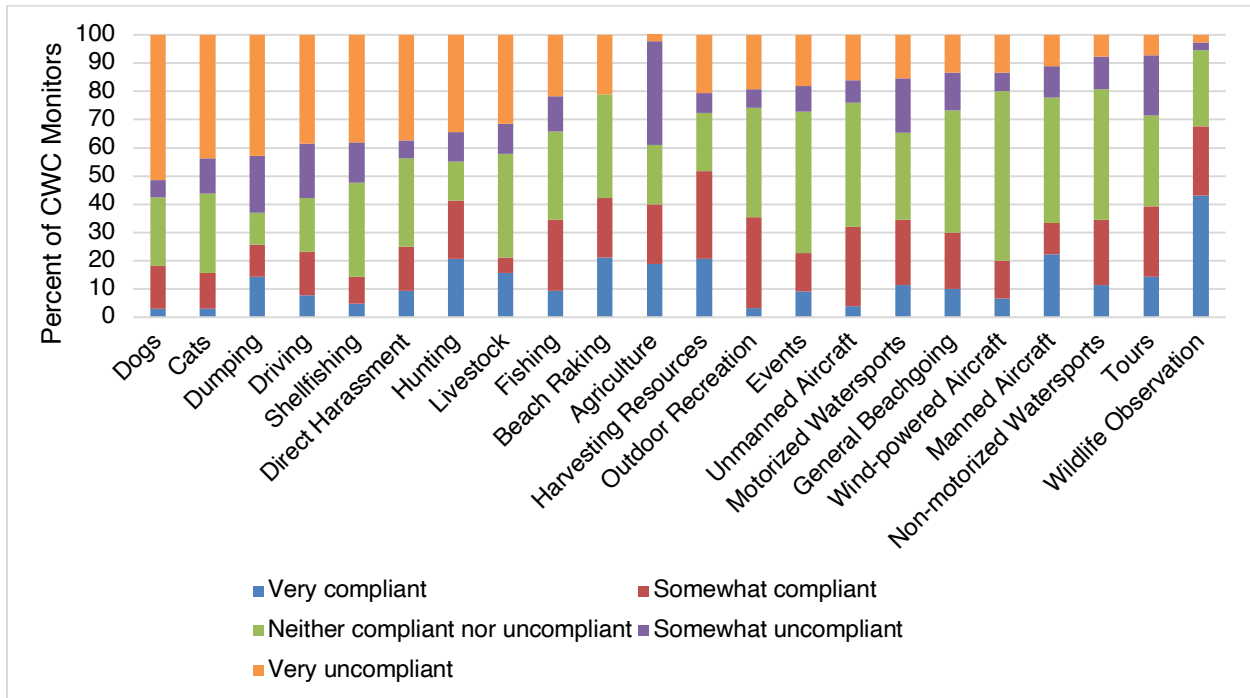


Figure 7. CWC monitors' perceptions of public compliance with restrictions related to potential human disturbances at a CWC site that they monitor and/or manage. Only individuals who had potential human disturbances present at their site reported compliance, therefore the number of individuals who responded ranged from 15 – 37 for each disturbance type.

Human Disturbance Monitoring

The majority of CWC monitors ($n = 46$ of 69) noted that they do not use systematic protocols (e.g., CWC data sheets, International Shorebird Survey (ISS), agency protocols, etc.) to monitor potential human disturbances, but they use informal observations ($n = 57$ of 66). Informal monitoring occurs more often in the winter and fall months and less often in the spring and summer months (Figure 8). When systematic monitoring is used, it occurs most often during February (29.4%) and January (26.5%; Figure 9), but generally occurs less frequently throughout the year compared to informal monitoring. When CWC monitors ($n = 68$) conduct systematic monitoring, they generally use CWC data sheets (30.9%) and the CWC site forms (16.2%) to record potential human disturbances. Fewer individuals use agency specific protocols (7.4%) and the International Shorebird Survey (5.9%).

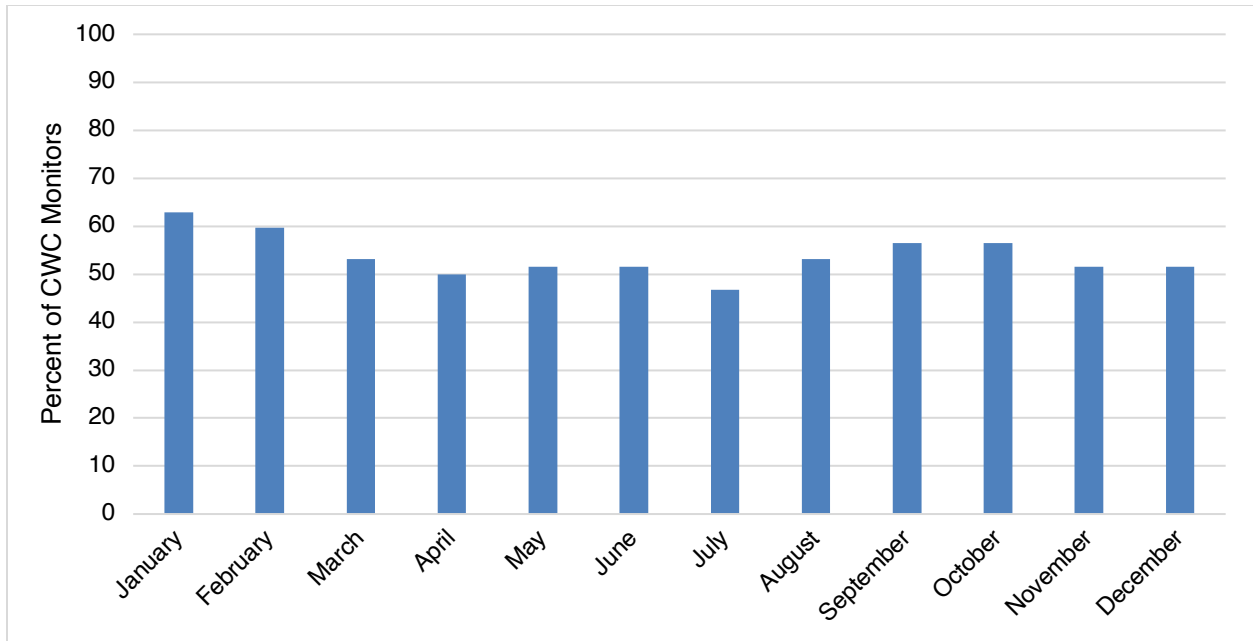


Figure 8. The percent of CWC monitors ($n = 62$) who record informal observations each month at a CWC site that they monitor and/or manage.

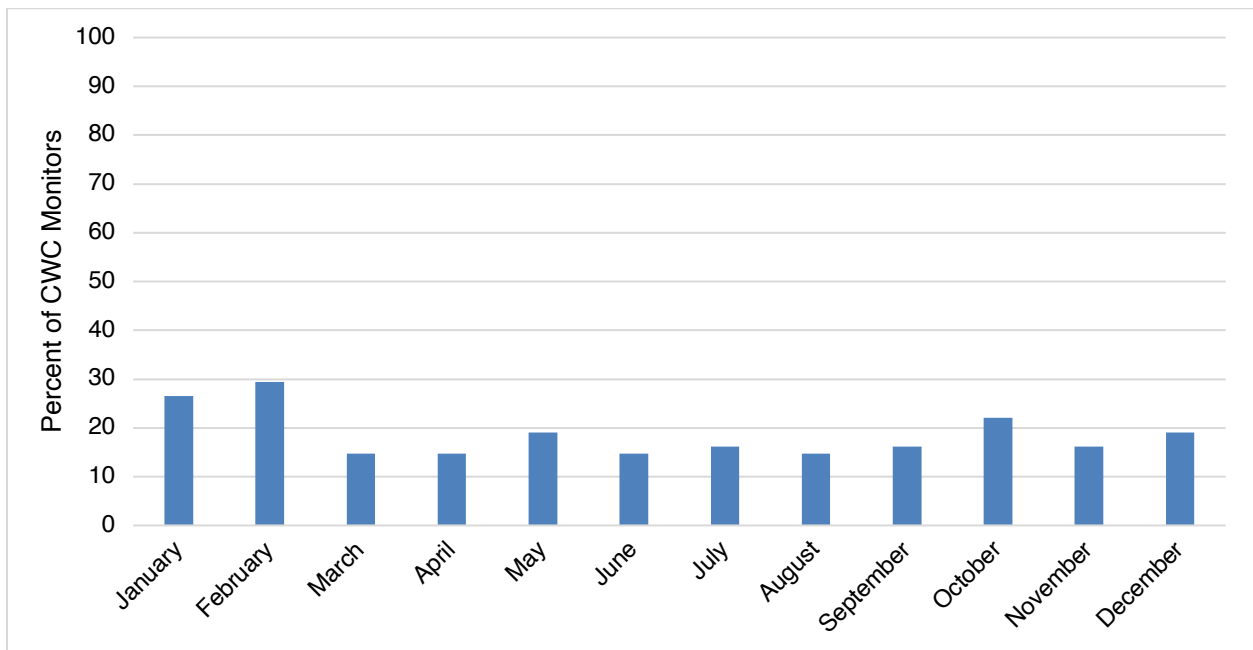


Figure 9. The percent of CWC monitors ($n = 69$) who use systematic protocols each month to monitor potential human disturbances at a CWC site.

Managing Potential Human Disturbances with Closures

The majority of CWC monitors noted that they do not have completely or partially closed areas at their sites (74.6%), whereas a smaller portion noted that they do use some type of closure for the protection of shorebirds from potential human disturbances (25.4%). The percent of CWC monitors who have closures at their sites is fairly

consistent throughout the year (Figure 10). The percent of CWC monitors who use communication tools to convey messages about closures was low (25%). The most common communication tool used to communicate messages about closures was signage (73.3%), followed by fencing (46.7%), informal conversations (26.7%), brochures (13.3%), websites (6.7%), and other methods (6.7%) such as regulations.

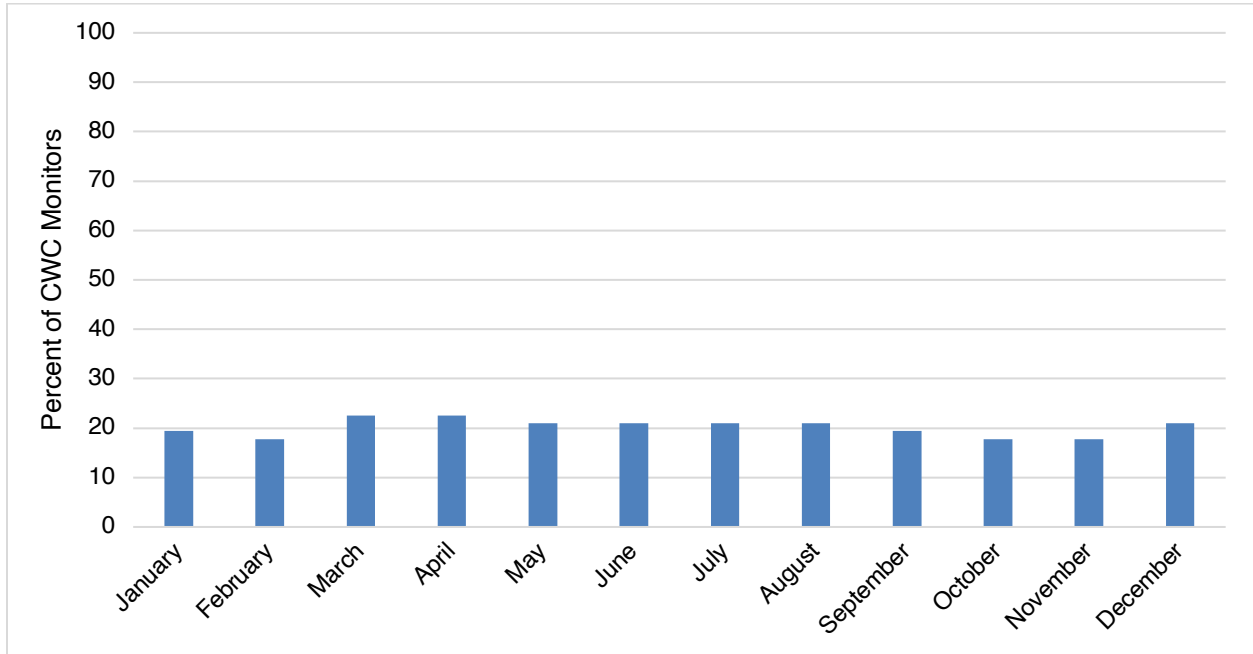


Figure 10. The percent of CWC monitors ($n = 63$) who have closures each month at a CWC site.

Effectiveness of Management Techniques

When asked about the effectiveness of management techniques for reducing potential human disturbances to shorebirds, CWC monitors reported that informational materials, outreach/interpretation, and informal outreach were the most effective approaches, whereas law enforcement was the least effective (Figure 11).

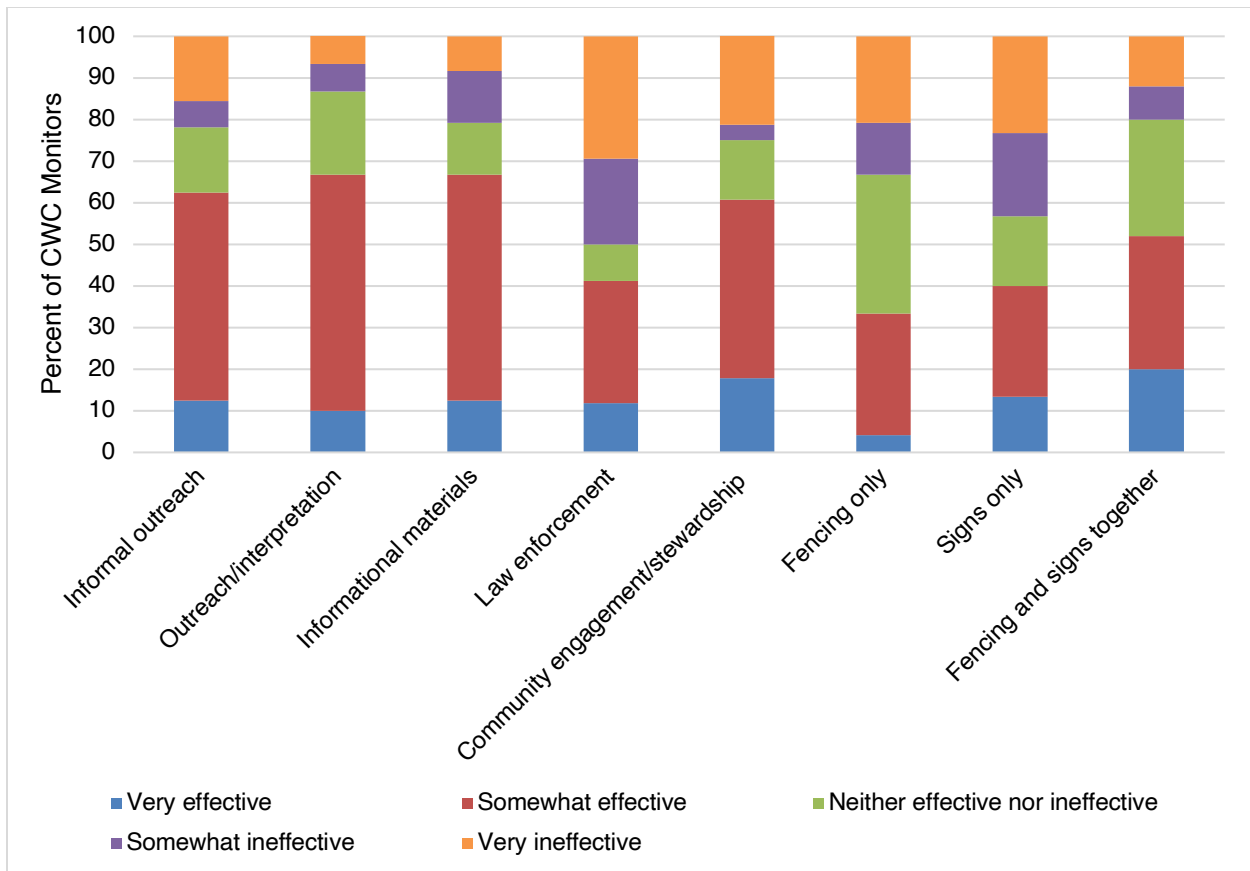


Figure 11. CWC monitors’ perceptions on the effectiveness of management practices at reducing potential human disturbances at a CWC site that they monitor and/or manage. Only individuals who had management practices at their site reported effectiveness, therefore the number of individuals who responded ranged from 24 – 34.

Resources Needed by CWC Monitors

CWC monitors rated social science information related to managing potential human disturbances to shorebirds (66.1%), biological information on the impacts of potential human disturbances to shorebirds (66.1%), and funding for non-personnel needs (e.g., equipment, signs, trail cameras, etc.; 66.1%) as the greatest resource needs. Training on methods for monitoring potential human disturbances (59.3%), volunteers (57.6%), and training on methods for managing potential human disturbances (55.9%) were also top resource needs (Figure 12). CWC monitors also noted other resource needs such as more environmental education, improved/updated laws and regulations for reducing potential human disturbances to shorebirds, improved control of site access to limit potential human disturbances in shorebird areas, additional efforts to enhance compliance by law enforcement and management agencies, and more regulations that limit coastal development.

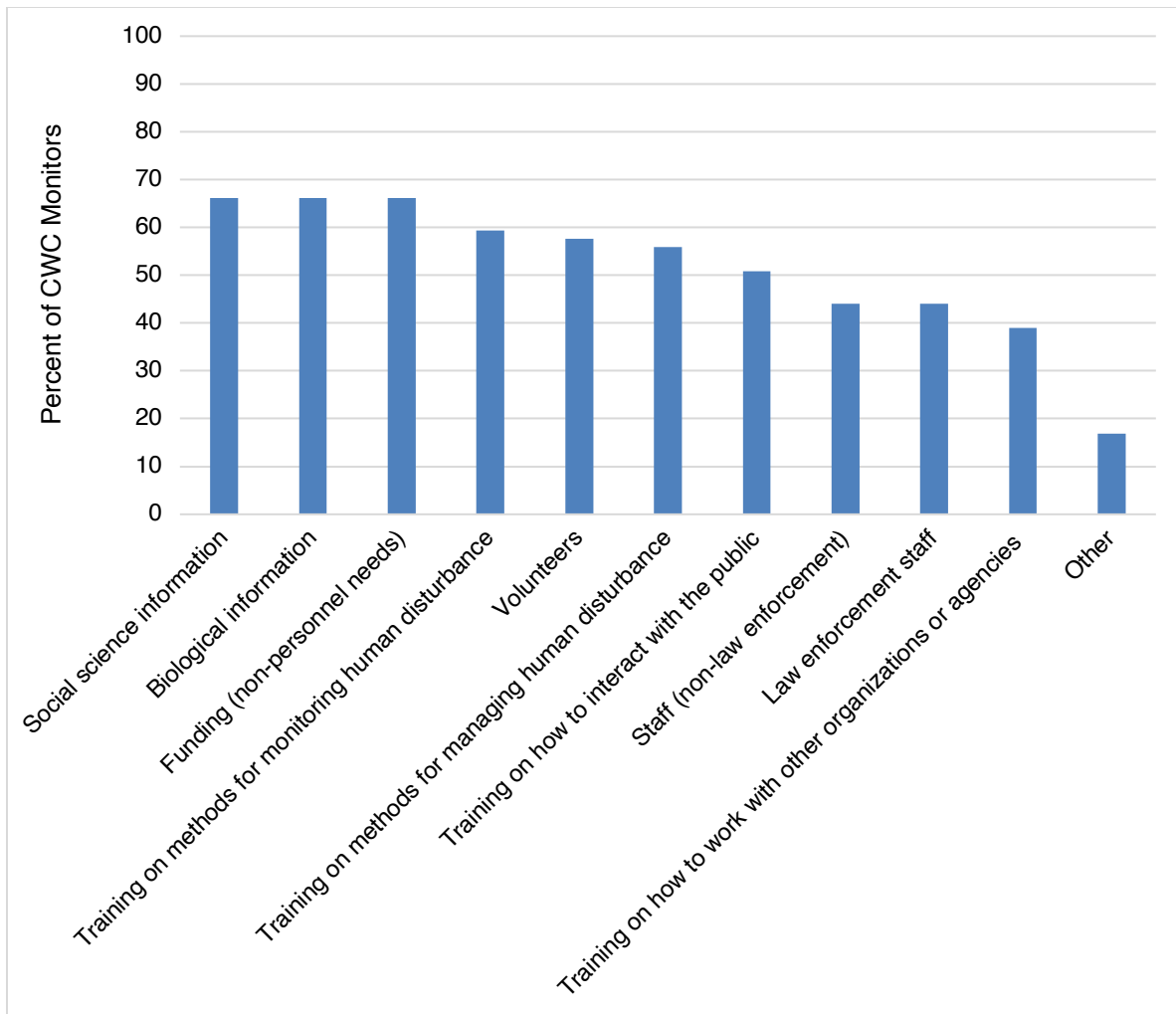


Figure 12. CWC monitors’ ($n = 59$) perceptions of resources needed at a CWC site that they monitor and/or manage.

Pro-environmental behaviors that could minimize potential human disturbances

Of the behaviors that CWC monitors evaluated, fourteen behaviors had a mean composite score of 60 or higher. The highest mean composite was “walk/run around shorebird flocks, rather than through flocks” and lowest mean composite score was “keep cats indoors.” Monitors also ranked “move slowly and quietly through wetlands,” “use binoculars or a camera to see birds without getting too close,” “stay on designated trails when you’re outdoors,” and “put plastic in recycling bins” as other top behaviors that could be promoted through a community-based social marketing campaign (Table 1).

Table 1. Summary of potential behaviors to promote through community-based social marketing. Impact, probability, and inverse penetration were analyzed using an online survey to CWC monitors. The behavior with the highest mean composite of these characteristics is the behavior best suited for CBSM.

Behavior	Impact _a	Probability _b	Inverse Penetration _c	Mean Composite Score _d
Walk/run around shorebird flocks, rather than through flocks	72.2	62.8	82.5	72.50
Move slowly and quietly through wetlands	73.3	64.4	73.1	70.27
Use binoculars or a camera to see birds without getting too close	80.4	79.5	50	69.97
Stay on designated trails when you're outdoors	74.3	65.8	64.5	68.20
Put plastic in recycling bins	64.8	54	84.4	67.73
Paddle at a distance from shorebirds	58.8	51.6	92	67.47
Launch drones away from shorebirds	54.6	53.3	91	66.30
Walk dogs on a leash	56.4	50	88.9	65.10
Leave seaweed/wrack on the beach	72.8	59.4	59.3	63.83
Put trash in trash cans	64.3	52.4	73	63.23
Lower boat speed near shorebirds	48	50	89.7	62.57

Lower vehicle speed near shorebirds	51.7	47.2	82.9	60.60
Take unwanted pets to an animal shelter	61.1	29.4	90.6	60.37
Tether livestock when they're near wetland areas	48.1	43.4	88.5	60.00
Leave a buffer zone around wetland areas when clearing land for agriculture	57.2	33.3	84	58.17
Keep cats indoors	47.3	32.5	90	56.60

a: Impact is the percent of CWC monitors who feel that the behavior will minimize human disturbances to shorebirds.

b: Probability measures the percent of CWC monitors who feel that beach recreationists could be encouraged to do the behaviors.

c: Penetration is the percent of CWC monitors 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 CWC monitors who do not feel that the behaviors are already being done by beach recreationists.

d: Mean composite is the average of impact, probability, and inverse penetration.

Discussion

This project aims to provide BirdsCaribbean with 1) an understanding of how potential human disturbances to shorebirds are monitored and managed at CWC sites, and 2) ways that CWC monitors can be better supported in their efforts to reduce potential human disturbances to shorebirds. Among the many pressures faced by shorebirds at CWC sites, monitors ranked human disturbance as the greatest threat. From the focus group, we heard first-hand accounts about the negative impacts that potential human disturbances have on shorebirds at CWC sites. Habitat loss from coastal development, habitat degradation from driving, dumping, and the introduction of predators (e.g., cats and dogs) were some of the most prominent disturbances that were discussed.

Past researchers and conservation practitioners have also identified pollution, dumping trash (Sorenson and Gerbracht 2014, D'Angelo 2022), and habitat loss/degradation as a major cause for the decline of shorebird populations in the Caribbean (e.g., Brown et al. 2001, Perdomo and Arias 2008, Levesque and Mathurin 2008, Brown and Brindock 2011, Brown and Synder 2013, Sorenson and Gerbracht 2014). Furthermore, development has led to an increase in introduced mammals (Brown and Brindock 2011) that either prey on shorebirds or indirectly cause disturbance. Free-ranging dogs (D'Angelo 2022), horses (*Equus caballus*) (Brown et al. 2001), rats (*Rattus rattus*), mongoose (*Herpestes auro-punctatus*), and domestic cats (Levesque and Mathurin 2008) are just some of the many mammalian predators that researchers and conservation practitioners have cited.

The survey results also reflect these issues and the general severity of potential human disturbances at CWC sites. Specifically, monitors noted that dogs (leashed, unleashed, and feral), dumping (trash, litter, plastic pollution), and wildlife observation (birdwatching, wildlife viewing, research, nature photography) were the most commonly occurring legal and/or illegal potential human disturbances at their sites in the last five years. Dogs and dumping also had the lowest levels of public compliance at sites where these activities were restricted.

One of the most prominent constraints to managing potential human disturbances at CWC sites is that most potential human disturbances are not restricted. For example, "wildlife observation" was the third most common disturbance faced by shorebirds, but 70% of monitors reported that there were no restrictions for this widespread potential human disturbance. This issue in the Caribbean contrasts with management in the United States and Canada, where potential human disturbances are generally restricted from April through August, during the shorebird breeding season (Comber and Dayer 2021).

In addition to having limited restrictions, the majority of CWC monitors do not have closures at their sites, and when sites do have closures, few monitors use communication tools to convey messages about closures. Although the survey showed that signs are the most common tool for communicating messages about closure at CWC sites, monitors in the focus group explained that signs can be vandalized or stolen and therefore are not always effective.

Furthermore, monitors noted that using law enforcement was the least effective approach for reducing potential human disturbances. As one focus group member explained, "we have legislation banning it [dumping], although there's fines and penalties it's just, just that nobody's, you know, getting caught in the act." Sorenson and Gerbracht (2014) also noted that even when important habitats are protected, human disturbance, such as development, can continue to persist. One possible reason for the lack of regulation enforcement might be that many CWC sites do not have law enforcement or park rangers present, despite having regulations or laws. As one focus group member noted, "We have no government support, no park rangers or coast guards." The lack of enforcement (Brown and Brindock 2011) and legal protection (Aguilar et al. 2020) to minimize human disturbance has been an ongoing issue in the Caribbean.

As such, it is not surprising that when asked about “other” resources needed, monitors added improved/updated laws and regulations for reducing potential human disturbances to shorebirds, improved access control to limit potential human disturbances in shorebird areas, improved job performance by law enforcement and management agencies, and more regulations that limit coastal development. Monitors also noted other resource needs such as social science information related to managing potential human disturbances to shorebirds, more biological information on the impacts of potential human disturbances to shorebirds, and funding for non-personal items. Our findings on resource needs are consistent with that of past researchers and conservation practitioners who called for more funding for shorebird research and monitoring (Cañizares and Reed 2020), more biological knowledge and research to fill major gaps in basic information about the status, distribution, habitat use, and migration patterns of wetland species (Sorenson and Gerbracht 2014), and increased law enforcement capacity (AFSI 2017), and awareness of species protection laws (Prosper et al. 2008).

To fulfill these needs, BirdsCaribbean has established several programs that support CWC monitors. For example, over the last twelve years, BirdsCaribbean has hosted six in-person, five-day training workshops (the last one in Cabo Rojo, Puerto Rico in 2019) in which Caribbean participants learned about shorebird identification, monitoring techniques, and conservation strategies (BirdsCaribbean 2019). In recent years, Birds Caribbean has hosted online trainings (webinars) on CWC and Piping Plover monitoring, waterbird and shorebird identification, as well as tutorials on how to use eBird. Additionally, BirdsCaribbean created a series of short videos and other materials to help CWC monitors learn shorebird identification. Furthermore, CWC monitors have been invited to share their monitoring results at BirdsCaribbean’s international conferences and webinars. These presentations, trainings, and resources are freely available online (BirdsCaribbean’s YouTube channel and website). Additional workshop trainings on shorebird ecology, monitoring, identification, threats and how to analyze monitoring data should be held in the future to keep monitors engaged in learning and to provide opportunities for new CWC monitors to join.

Future in-person and online trainings should focus on the needs of CWC monitors that have been identified through this project. For example, one workshop could cover methods for recognizing and systematically monitoring human disturbance since our findings show that the use of systematic protocols to record human disturbance is low and census efforts greatly vary throughout the Caribbean (Sorenson and Gerbracht 2014). Also, because our findings show that experience among CWC monitors varies, workshops could be conducted for different experience levels, focusing on the needs of each group. For example, novice CWC monitors could focus on shorebird identification, whereas experienced monitors could focus on how to mentor new CWC monitors and train other CWC monitors on their home islands within the Caribbean.

In-person and online trainings could also provide guidance on applying for grants, including information on the types of funding available, the process of registering to be eligible for federal funds, and training on mentoring and how to prepare an

effective proposal. Such trainings could improve access to grants that provide funding for additional staff or equipment needed to monitor and manage human disturbances to shorebirds. Providing skills and information that enable CWC monitors to acquire funds for human disturbance management is especially important because funding governments and organizations that prioritize shorebird research and monitoring is essential for closing knowledge gaps (Cañizares and Reed 2020).

Knowledge gaps may also be reduced through forming partnerships with universities that can employ students or faculty to conduct research, such as biological research on the status, distribution, habitat use, and migration patterns of wetland species. Such partnerships have been successful in the past (BirdsCaribbean 2015), and could be implemented more regularly and broadly across CWC sites. Through workshops, CWC monitors can learn how to form partnerships that would increase biological data collection. Workshops can also serve as a platform for CWC monitors to engage with experts at universities who are knowledgeable about social science information and could teach CWC monitors how to use social science techniques to interact with the public and manage potential human disturbances to shorebirds.

In addition to providing training workshops, organizations such as BirdsCaribbean can support CWC monitors and a wider community of stakeholders in the Caribbean through education and outreach campaigns that increase awareness and appreciation of the many functions and values of local wetlands. This in turn could encourage whole communities to engage and take action when inappropriate coastal development is proposed. Greater knowledge and awareness can also increase support for improving law enforcement capacity and performance, stronger protection for wetlands, including regulations that limit coastal development (although this does not guarantee their protection from development, e.g., Sorenson 2020), and limiting access to important shorebird areas. Outreach programs such as BirdsCaribbean's Wetlands Education Training Workshops and curricula have had success at achieving some of these goals.

An education and outreach campaign targeted at management agencies (e.g., Ministries of the Environment) could help with improving regulations that protect wetlands and birds. Similar campaigns directed at law enforcement personnel, e.g., park wardens/enforcers, could improve their understanding of the current regulations that protect shorebirds in the Caribbean, and why regulations are needed. Such outreach programs could involve CWC monitors taking ministers and wardens on guided bird walks, allowing them to see the shorebird species that they protect while learning about the conservation challenges they face, and how those challenges can be mitigated through the work of the ministry, land managers, and wardens. This has been a successful approach in several islands, e.g., Montserrat (e.g., White 2021).

Although some CWC sites have enforcers, our findings show that environmental law enforcement capacity is limited in the Caribbean, therefore implementing education and outreach campaigns at the community level may be an effective approach for enhancing shorebird conservation where law enforcement is limited or absent. CBSM is one such approach that could be used to implement environmental education and outreach at the community level. Through this project, we have identified fourteen pro-

environmental behaviors (CBSM step one) that can serve as the foundation for CBSM campaigns in the Caribbean. Using these findings, we will work alongside BirdsCaribbean, and local Caribbean partners to identify benefits and constraints (CBSM step two) of the selected behavior at twelve sites across three Caribbean islands. While doing this, we will collect baseline data on the extent of disturbance at each site. Next, we will design CBSM campaigns (CBSM step 3) using the strategies outlined by McKenzie-Mohr (2011), such as community outreach. Following this step, we will work with local partners to implement the campaigns and assess their effectiveness using biological and social science data (CBSM step 4). Insights from the application of this work can be shared across the Caribbean (CBSM step 5) to more broadly enhance shorebird conservation efforts in this region.

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Appendix A: Focus Group Recruitment Emails

First Focus Group Recruitment Email

English/Inglés/Anglais:

Subject: Caribbean Waterbird Census Focus Group Invitation

Dear [insert name],

Virginia Tech and BirdsCaribbean would like to invite you to take part in a meeting to share information about ways that BirdsCaribbean can improve human disturbance management at the Caribbean Waterbird Census monitors (CWC) sites that you monitor.

For the meeting, we are specifically interested in learning how human disturbance is defined at the CWC sites that you monitor, as well as potential human disturbance activities at your sites. With the information from the focus group discussion, we will create a survey to administer to CWC monitors that will aim to identify ways for BirdsCaribbean to improve human disturbance management for shorebirds at CWC sites.

To understand perspectives on this topic, we will host a virtual meeting. The meeting will consist of a discussion led by Virginia Tech and will last 90 minutes. The facilitated discussion will be audio-recorded to ensure that we accurately document statements, but all comments will be reported anonymously. The potential benefit to you is informing future programs and management actions that could benefit the CWC sites that you monitor.

To identify a date that works best for everyone, please fill out the following poll by Wednesday, February 22. Once we hear from everyone, we will send out an email with the date, time, and a zoom link for the focus group discussion.

If you do not have experience as a CWC monitor or are not 18 or older, please let us know so we can remove you from further email correspondence.

Please let us know if you are able to attend the meeting by contacting Carolyn Comber at ccomber1@vt.edu.

Sincerely,
Carolyn Comber
Research Associate
Virginia Tech

Spanish/Español/Espagnol

Asunto: Censo de Aves Acuáticas del Caribe Invitación al grupo de discusión
Estimado José,

Virginia Tech y BirdsCaribbean desean invitarle a participar en una reunión para compartir información sobre las formas en que BirdsCaribbean puede mejorar la gestión de las perturbaciones humanas en los sitios del Censo de Aves Acuáticas del Caribe (CWC) que usted monitorea.

Para la reunión, estamos específicamente interesados en saber cómo se define la perturbación humana en los sitios del CWC que usted monitorea, así como las posibles actividades de perturbación humana en sus sitios. Con la información de la discusión del grupo focal, crearemos una encuesta para administrar a los monitores del CWC que tendrá como objetivo identificar formas para que BirdsCaribbean mejore la gestión de las perturbaciones humanas para las aves playeras en los sitios del CWC.

Para conocer las perspectivas sobre este tema, organizaremos una reunión virtual. La reunión consistirá en un debate dirigido por Virginia Tech y durará 90 minutos. El debate se grabará en audio para garantizar que las declaraciones se documentan con precisión, pero todos los comentarios se comunicarán de forma anónima. El beneficio potencial para usted es informar sobre futuros programas y acciones de gestión que podrían beneficiar a los sitios de CWC que usted supervisa.

Para determinar la fecha más conveniente para todos, rellene la siguiente encuesta antes del miércoles 22 de febrero. Una vez que tengamos noticias de todos los que vayan a participar en el grupo de discusión, enviaremos un correo electrónico con la fecha, la hora y un enlace de zoom.

Si no tienes experiencia como monitor del CWC o no eres mayor de 18 años, háznoslo saber para que podamos eliminarte de la correspondencia posterior por correo electrónico.

Para cualquier pregunta adicional, no dude en ponerse en contacto con Carolyn Comber en ccomber1@vt.edu.

Atentamente,
Carolyn Comber
Investigadora Asociada
Virginia Tech

French/Francés/Français:

Sujet : Invitation au groupe de discussion du recensement des oiseaux d'eau des Caraïbes

Cher [insert name],

Virginia Tech et BirdsCaribbean aimeraient vous inviter à participer à une réunion afin de partager des informations sur les façons dont BirdsCaribbean peut améliorer la gestion des perturbations humaines sur les sites du Caribbean Waterbird Census (CWC) que vous surveillez.

Pour cette réunion, nous sommes particulièrement intéressés par la façon dont les perturbations humaines sont définies sur les sites du CWC que vous surveillez, ainsi que par les activités potentielles de perturbation humaine sur vos sites. Avec les informations issues de la discussion de groupe, nous créons une enquête à administrer aux surveillants du CWC qui visera à identifier les moyens pour BirdsCaribbean d'améliorer la gestion des perturbations humaines pour les oiseaux de rivage sur les sites du CWC.

Pour comprendre les perspectives sur ce sujet, nous organiserons une réunion virtuelle. La réunion consistera en une discussion animée par Virginia Tech et durera 90 minutes. La discussion animée fera l'objet d'un enregistrement audio afin de s'assurer que nous documentons avec précision les déclarations, mais tous les commentaires seront rapportés de manière anonyme. L'avantage potentiel pour vous est d'informer les futurs programmes et actions de gestion qui pourraient bénéficier aux sites de la CWC que vous surveillez.

Afin de déterminer la date qui convient le mieux à chacun, veuillez remplir le questionnaire suivant avant le mercredi 22 février. Une fois que nous aurons reçu les réponses de toutes les personnes qui participeront au groupe de discussion, nous enverrons un courriel indiquant la date, l'heure et un lien de zoom.

Si vous n'avez pas d'expérience en tant que moniteur CWC ou si vous n'avez pas 18 ans ou plus, veuillez nous le faire savoir afin que nous puissions vous retirer de toute correspondance ultérieure.

Pour toute question supplémentaire, n'hésitez pas à contacter Carolyn Comber à l'adresse ccomber1@vt.edu.

Cordialement,
Carolyn Comber
Associée de recherche

Virginia Tech

Second Focus Group Recruitment Email

(For individuals who did not fill out the first poll)

English/Inglés/Anglais:

Subject: Reminder: Caribbean Waterbird Census Focus Group Invitation

Dear [insert name],

Virginia Tech and BirdsCaribbean recently invited you to take part in a meeting to share information about ways that BirdsCaribbean can improve human disturbance management at the Caribbean Waterbird Census (CWC) sites that you monitor.

For the meeting, we are specifically interested in learning how human disturbance is defined at the CWC sites that you monitor, as well as potential human disturbance activities at your sites. With the information from the focus group discussion, we will create a survey to administer to CWC monitors that will aim to identify ways for BirdsCaribbean to improve human disturbance management for shorebirds at CWC sites.

To understand perspectives on this topic, we will host a virtual meeting. The meeting will consist of a discussion led by Virginia Tech and will last 90 minutes. The facilitated discussion will be audio-recorded to ensure that we accurately document statements, but all comments will be reported anonymously. The potential benefit to you is informing future programs and management actions that could benefit the CWC sites that you monitor.

To identify a date that works best for everyone, we sent a poll last week. Because of limited availability in peoples' schedules we were not able to find a day and time that worked well for most people. **To better accommodate the group, we created a new poll with additional dates and time slots. We would appreciate it if you could please fill out the new poll by Tuesday, February 28th.** Once we hear from everyone who will take part in the focus group, we will send out an email with the date, time, and a zoom link.

If you do not have experience as a CWC monitor or are not 18 or older, please let us know so we can remove you from further email correspondence.

For any additional questions, feel free to contact Carolyn Comber at ccomber1@vt.edu.

Sincerely,
Carolyn Comber

Research Associate
Virginia Tech

Spanish/Español/Espagnol

Asunto: Recordatorio: Invitación al grupo de discusión del Censo de Aves Acuáticas del Caribe

Estimado [insertar nombre],

Virginia Tech y BirdsCaribbean le invitaron recientemente a participar en una reunión para compartir información sobre las formas en que BirdsCaribbean puede mejorar la gestión de las perturbaciones humanas en los sitios del Censo de Aves Acuáticas del Caribe (CWC) que usted monitorea.

Para la reunión, estamos específicamente interesados en saber cómo se define la perturbación humana en los sitios del CWC que usted monitorea, así como las posibles actividades de perturbación humana en sus sitios. Con la información de la discusión del grupo focal, crearemos una encuesta para administrar a los monitores del CWC que tendrá como objetivo identificar formas para que BirdsCaribbean mejore la gestión de las perturbaciones humanas para las aves playeras en los sitios del CWC.

Para conocer las perspectivas sobre este tema, organizaremos una reunión virtual. La reunión consistirá en un debate dirigido por Virginia Tech y durará 90 minutos. El debate se grabará en audio para garantizar que las declaraciones se documentan con precisión, pero todos los comentarios se comunicarán de forma anónima. El beneficio potencial para usted es informar sobre futuros programas y acciones de gestión que podrían beneficiar a los sitios de CWC que usted supervisa.

Para determinar la fecha que mejor convenga a todos, enviamos una encuesta la semana pasada. Debido a la limitada disponibilidad en los horarios de la gente, no pudimos encontrar un día y una hora que funcionaran bien para la mayoría. Para acomodar mejor al grupo, hemos creado una nueva encuesta con fechas y franjas horarias adicionales. Os agradeceríamos que rellenarais la nueva encuesta antes del martes 28 de febrero. Una vez que tengamos noticias de todos los que vayan a participar en el grupo de discusión, les enviaremos un correo electrónico con la fecha, la hora y un enlace de zoom.

Si no tienes experiencia como monitor del CWC o no eres mayor de 18 años, háznoslo saber para que podamos eliminarte de la correspondencia posterior por correo electrónico.

Para cualquier pregunta adicional, no dude en ponerse en contacto con Carolyn Comber en ccomber1@vt.edu.

Atentamente,
Carolyn Comber
Investigadora Asociada
Virginia Tech

French/Francés/Français:

Objet : Rappel : Invitation au groupe de réflexion sur le recensement des oiseaux d'eau des Caraïbes

Cher [insérer le nom],

Virginia Tech et BirdsCaribbean vous ont récemment invité à participer à une réunion afin de partager des informations sur la façon dont BirdsCaribbean peut améliorer la gestion des perturbations humaines sur les sites du Caribbean Waterbird Census (CWC) que vous surveillez.

Pour cette réunion, nous souhaitons plus particulièrement savoir comment les perturbations humaines sont définies sur les sites du CWC que vous surveillez, ainsi que les activités potentielles de perturbation humaine sur vos sites. Avec les informations issues de la discussion de groupe, nous créerons une enquête à administrer aux observateurs du CWC qui visera à identifier les moyens pour BirdsCaribbean d'améliorer la gestion des perturbations humaines pour les oiseaux de rivage sur les sites du CWC.

Pour comprendre les points de vue sur ce sujet, nous organiserons une réunion virtuelle. La réunion consistera en une discussion animée par Virginia Tech et durera 90 minutes. La discussion animée sera enregistrée pour s'assurer que nous documentons correctement les déclarations, mais tous les commentaires seront rapportés de manière anonyme. L'avantage potentiel pour vous est d'informer les futurs programmes et actions de gestion qui pourraient bénéficier aux sites de CWC que vous surveillez.

Afin d'identifier la date qui conviendrait le mieux à chacun, nous avons envoyé un sondage la semaine dernière. En raison de la disponibilité limitée des emplois du temps, nous n'avons pas été en mesure de trouver un jour et une heure qui conviennent à la plupart des personnes. Pour mieux satisfaire le groupe, nous avons créé un nouveau sondage avec des dates et des créneaux horaires supplémentaires. Nous vous serions reconnaissants de bien vouloir répondre à ce nouveau sondage avant le mardi 28 février. Une fois que nous aurons reçu le nom de toutes les personnes qui participeront au groupe de discussion, nous enverrons un courrier électronique indiquant la date, l'heure et un lien de zoom.

Si vous n'avez pas d'expérience en tant que moniteur du CWC ou si vous n'avez pas 18 ans ou plus, veuillez nous le faire savoir afin que nous puissions vous retirer de la correspondance électronique.

Pour toute question supplémentaire, n'hésitez pas à contacter Carolyn Comber à l'adresse ccomber1@vt.edu.

Je vous prie d'agréer, Madame, Monsieur, l'expression de mes salutations distinguées,
Carolyn Comber
Associée de recherche
Virginia Tech

Second Focus Group Recruitment Email

(For individuals who filled out the first poll)

English/Inglés/Anglais:

Subject: New Request: Caribbean Waterbird Census Focus Group Invitation

Dear [insert name],

Virginia Tech and BirdsCaribbean recently invited you to take part in a meeting to share information about ways that BirdsCaribbean can improve human disturbance management at the Caribbean Waterbird Census (CWC) sites that you monitor.

We appreciate you taking the time to complete the poll for determining a meeting time for the focus group discussion. Because of limited availability in peoples' schedules we were not able to find a day and time that worked well for most people. **To better accommodate the group, we created a new poll with additional dates and time slots. We would appreciate if you could please fill out the new poll by Tuesday, February 28th.** Once we hear from everyone who will take part in the focus group, we will send out an email with the date, time, and a zoom link.

For any additional questions, feel free to contact Carolyn Comber at ccomber1@vt.edu.

Sincerely,
Carolyn Comber
Research Associate
Virginia Tech

Spanish/Español/Espagnol

Asunto: Nueva solicitud: Censo de Aves Acuáticas del Caribe Invitación al Grupo de Enfoque

Estimado [insertar nombre],

Virginia Tech y BirdsCaribbean le invitaron recientemente a participar en una reunión para compartir información sobre las formas en que BirdsCaribbean puede mejorar la gestión de las perturbaciones humanas en los sitios del Censo de Aves Acuáticas del Caribe (CWC) que usted monitorea.

Le agradecemos que haya dedicado parte de su tiempo a rellenar la encuesta para determinar la hora de la reunión del grupo de discusión. Debido a la limitada disponibilidad en los horarios de la gente, no pudimos encontrar un día y una hora que funcionaran bien para la mayoría de las personas. Para acomodar mejor al grupo, hemos creado una nueva encuesta con fechas y franjas horarias adicionales. Os agradeceríamos que rellenarais la nueva encuesta antes del martes 28 de febrero. Una vez que tengamos noticias de todos los que vayan a participar en el grupo de discusión, les enviaremos un correo electrónico con la fecha, la hora y un enlace de zoom.

Para cualquier pregunta adicional, no dude en ponerse en contacto con Carolyn Comber en ccomber1@vt.edu.

Atentamente,
Carolyn Comber
Investigadora asociada
Virginia Tech

French/Francés/Français:

Objet : Nouvelle demande : Invitation au groupe de réflexion sur le recensement des oiseaux d'eau des Caraïbes

Cher [insérer le nom],

Virginia Tech et BirdsCaribbean vous ont récemment invité à participer à une réunion pour partager des informations sur la façon dont BirdsCaribbean peut améliorer la gestion des perturbations humaines sur les sites du Caribbean Waterbird Census (CWC) que vous surveillez.

Nous vous remercions d'avoir pris le temps de répondre au sondage pour déterminer l'heure de la réunion du groupe de discussion. En raison de la disponibilité limitée des emplois du temps, nous n'avons pas été en mesure de trouver un jour et une heure qui conviennent à la plupart des participants. Pour mieux répondre aux besoins du groupe, nous avons créé un nouveau sondage avec des dates et des créneaux horaires supplémentaires. Nous vous serions reconnaissants de bien vouloir répondre à ce nouveau sondage avant le mardi 28 février. Une fois que nous aurons reçu les réponses de toutes les personnes qui participeront au groupe de discussion, nous enverrons un courrier électronique indiquant la date, l'heure et un lien pour zoomer.

Pour toute question supplémentaire, n'hésitez pas à contacter Carolyn Comber à l'adresse ccomber1@vt.edu.

Je vous prie d'agréer, Madame, Monsieur, l'expression de mes salutations distinguées,
Carolyn Comber
Associée de recherche
Virginia Tech

Third Focus Group Recruitment Email

(For individuals who filled out the second poll)

English/Inglés/Anglais:

Subject: Final Details for Caribbean Waterbird Census Focus Group

Dear CWC Monitors,

Thank you for taking the poll to determine a date for the focus group discussion on managing human disturbances to shorebirds at CWC sites. The focus group will take place virtually on **Wednesday, March 8th** from 11 AM to 12:30 pm EST. **Here is the zoom link for the focus group discussion.** So far we have the following individuals signed up for the focus group:

[Participant names have been removed]

If your name is not on this list, but you would like to join the discussion, please email me so I can add you to the list. During the meeting, we will ask you questions about human disturbance activities that occur at your CWC sites.

To help facilitate the conversation, we will review the attached list to determine the types of human disturbance activities that occur. We will ask you if there are activities that should be added or removed. If you can, **please look at this list of potential**

human disturbance activities ahead of time and think about how it compares to human disturbances at your sites.

As compensation for joining the focus group discussion, each person will receive a \$50 Amazon gift card. If you have any questions, feel free to reach out to me at ccomber1@vt.edu.

Thank you,
Carolyn

Spanish/Español/Espagnol

Asunto: Detalles finales para el Grupo de Enfoque del Censo de Aves Acuáticas del Caribe

Estimados monitores del CWC

Gracias por participar en la encuesta para determinar la fecha de la discusión del grupo focal sobre el manejo de las perturbaciones humanas a las aves playeras en los sitios del CWC. El grupo de discusión tendrá lugar virtualmente el miércoles 8 de marzo de 11 AM a 12:30 pm EST. Aquí está el enlace de zoom para la discusión del grupo de enfoque. Hasta el momento tenemos las siguientes personas inscritas para el grupo de enfoque:

[Se han suprimido los nombres de los participantes].

Si su nombre no figura en esta lista, pero desea participar en el debate, envíeme un correo electrónico para que pueda añadirle a la lista. Durante la reunión, le haremos preguntas sobre las actividades de perturbación humana que tienen lugar en los lugares donde usted trabaja.

Para facilitar la conversación, revisaremos la lista adjunta para determinar los tipos de actividades de perturbación humana que se producen. Le preguntaremos si hay actividades que deban añadirse o eliminarse. Si puede, consulte esta lista de posibles actividades de perturbación humana con antelación y piense en cómo se compara con las perturbaciones humanas en sus yacimientos.

Como compensación por participar en el grupo de discusión, cada persona recibirá una tarjeta regalo de 50 dólares de Amazon. Si tiene alguna pregunta, no dude en ponerse en contacto conmigo en ccomber1@vt.edu.

Muchas gracias,
Carolyn

French/Francés/Français:

Objet : Détails finaux pour le Groupe de réflexion sur le recensement des oiseaux d'eau des Caraïbes

Chers moniteurs du CWC,

Nous vous remercions d'avoir participé au sondage visant à déterminer la date du groupe de discussion sur la gestion des perturbations humaines des oiseaux de rivage sur les sites du CWC. Le groupe de discussion aura lieu virtuellement le mercredi 8 mars de 11 h à 12 h 30 (HNE). Voici le lien de zoom pour le groupe de discussion. Jusqu'à présent, les personnes suivantes se sont inscrites au groupe de discussion :

[Les noms des participants ont été supprimés]

Si votre nom ne figure pas sur cette liste, mais que vous souhaitez participer à la discussion, veuillez m'envoyer un courriel afin que je puisse vous ajouter à la liste. Au cours de la réunion, nous vous poserons des questions sur les activités de perturbation humaine qui se déroulent sur vos sites CWC.

Pour faciliter la conversation, nous examinerons la liste ci-jointe afin de déterminer les types d'activités de perturbation humaine qui ont lieu. Nous vous demanderons s'il y a des activités qui devraient être ajoutées ou supprimées. Si vous le pouvez, nous vous invitons à consulter à l'avance cette liste d'activités potentiellement perturbatrices pour l'homme et à réfléchir à la manière dont elle se compare aux perturbations humaines qui se produisent sur vos sites.

En guise de compensation pour sa participation au groupe de discussion, chaque personne recevra une carte-cadeau Amazon d'une valeur de 50 \$. Si vous avez des questions, n'hésitez pas à me contacter à l'adresse ccomber1@vt.edu.

Je vous remercie de votre attention,
Carolyn

Appendix B: Focus Group Script

Location: [Virtual]

Date: [March 8, 2023]

Time: [11:00 – 12:30 pm EST]

Welcome everyone and thank you for attending today's meeting. I'm Carolyn Comber, a researcher at Virginia Tech, and I'll be the facilitator for today's discussion. We also have Sami Livingston from Virginia Tech and she will also be facilitating the meeting today. In addition to Sami and myself, we are joined by Lisa Sorenson and Alex Sansom from BirdsCaribbean.

Before we get started, I want to mention that we have some group members who are not native English speakers, so if anyone needs me to repeat anything, feel free to let me know. We also have some group members who are available to assist in translating. You can raise your hand or send a message in the chat if you need something translated and we'll get someone to help you.

Our plan for today is to start by giving you background information about the meeting and its format, and then we'll begin our discussion.

As we mentioned in your invitation email, Virginia Tech is conducting a project in collaboration with BirdsCaribbean to learn about potential human disturbances to shorebirds at Caribbean Waterbird Census (CWC) sites and ways to improve managing and monitoring human disturbance at those sites. For this meeting, we are specifically interested in learning about the definition of human disturbance, the types of human disturbances activities that occur at your sites, as well as behaviors that could reduce human disturbance to shorebirds at your sites. With the information from this focus group discussion, we'll create a survey to explore human disturbance management at Caribbean Waterbird Census sites.

The focus group and survey will be used to inform a report provided to BirdsCaribbean, as well as a scientific journal article. Your responses to our questions will never be associated with your name, so we welcome your honest and candid responses. We are planning to audio record the meeting to ensure we capture your comments correctly. The audio recording will only be used by the Virginia Tech team.

Your participation in this meeting is completely voluntary. You may stop participating in the meeting at any time or choose not to answer any questions. This meeting will last approximately 90 minutes, and the process will be straightforward – we have a set of questions to help us learn about human disturbances to shorebirds, and we will guide you through those questions. As we move through the discussion, anyone can respond in any order. And if you would like to add information to the chat, you may also use that to contribute your thoughts.

There are a few quick guidelines that we ask everyone follow as we begin our discussion:

Guidelines

- Please be respectful to the responses that others provide
- I'll be keeping track of time to make sure we get through everything. I apologize in advance if I interrupt anyone or move things along. We have a lot of material to cover and I need to make sure we get through all of it in the time we have.

At this point, are there any questions about the process? [Wait for response]

Introductions

Great, then to start things off, we would like everyone to get to know each other a little better so let's all go around and briefly tell everyone:

- Your name
- Your job title
- The CWC sites that you manage or monitor
- The length of time you've been monitoring shorebirds at CWC sites

Thank you everyone for sharing that information about yourselves.

Focus Group Questions

For the first part of our discussion, we'll go over the definition of human disturbance and then look at different disturbance categories with examples of activities in those categories. Then we'll move on to the second part of the discussion, where we'll ask you to explain how human disturbance is monitored at your sites and what resources might be needed to aid in human disturbance management. Lastly, we'll ask you about pro-environmental behaviors that could minimize human disturbance to shorebirds at your sites.

So, to begin our discussion, let's first talk about the definition of human disturbance. A few years ago, a group of shorebird experts in the United States contributed to a definition of human disturbance through a process led by my colleagues at Virginia Tech.

Here on the screen [display the definition on the screen] is the definition of human disturbance that was developed by shorebird experts in the United States.

[Read human disturbance definition out loud]

Human disturbance of shorebirds 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.

1. After hearing this definition, we are curious to know if this definition is also applicable to the sites that you monitor?
 - Prompt: So for instance, are there any components of human disturbance at your sites that are not captured by this definition?
 - Prompt: Are there any components of the definition that are not applicable to your sites?

Thank you for sharing that information. Now we would like to know what types of disturbances are faced by shorebirds at your sites.

Here in this table we have just some of the many disturbance categories faced by shorebirds.

[show table on the screen]

Because shorebirds can be found in a variety of habitats such as mangroves, salt ponds, mudflats, and lagoons, we would like you to keep in mind the range of habitats found at the CWC sites that you monitor and the disturbances that might be faced by shorebirds in the many different habitat types.

<p><u>Agriculture</u> People working on agricultural land in/around wetlands</p>	<p><u>Beach raking/cleaning</u> Manually or mechanically cleaning with hand-tools or heavy machinery</p>	<p><u>Bike riding</u> Cycling Fat tire bikes</p>	<p><u>Camping</u> Camping on beach Bonfires</p>
<p><u>Cats</u> Domestic Feral</p>	<p><u>Coastal engineering</u> Beach nourishment Dune stabilization Construction projects (e.g., jetties, seawalls, and other coastal hardening)</p>	<p><u>Direct harassment</u> Actively chasing birds Disturbing or destroying nests</p>	<p><u>Dogs</u> Leashed Unleashed Feral</p>

<p><u>Driving</u> 4x4 ATV (All Terrain Vehicles)</p>	<p><u>Events</u> Fishing tournaments Festivals Parties Sports competitions Fireworks</p>	<p><u>Fishing</u> Recreational Commercial Surf fishing Bone fishing Aquaculture (e.g., shrimp & seamoss farming)</p>	<p><u>Food attractants</u> Feeding wildlife Leaving bait Leaving trash</p>
<p><u>General beachgoing</u> Walking Running/jogging Beachcombing Beach games (e.g., frisbee, ball) Sunbathing Picnicking/cookout Swimming/snorkeling</p>	<p><u>Harvesting resources</u> Seaweed Seamoss Wood Reeds Grasses Salt picking Bait collection</p>	<p><u>Hiking</u></p>	<p><u>Horseback riding</u></p>
<p><u>Hunting</u></p>	<p><u>Livestock</u> Untethered / free roaming livestock (e.g., cattle, goats)</p>	<p><u>Manned aircraft</u> Helicopters Low-flying planes Jet planes</p>	<p><u>Motorized watersports</u> Boats Airboats Speedboats Jet-skis</p>
<p><u>Non-motorized watersports</u> Kayaking/ canoeing Paddleboarding Sailing Parasailing Kite boarding/ Kite surfing Surfing/ wind surfing Boogie boards</p>	<p><u>Official patrols</u> Law enforcement patrol Lifeguards Hotel security patrol</p>	<p><u>Shellfishing</u> Clamming Crabbing Oyster racks Shrimping Conch harvest</p>	<p><u>Tours</u> Boat tours Walking tours Birding/ mangrove tours</p>
<p><u>Unmanned aircraft</u> Drones / UAVs (Unmanned Aerial Vehicle) Model aircraft Rocket launches</p>	<p><u>Wildlife observation</u> Birdwatching Wildlife viewing Nature photography Bird call playbacks</p>	<p><u>Wildlife research</u> Wildlife surveys Sea turtle surveys Banding/netting</p>	<p><u>Wind-powered aircraft</u> Paragliding Hang-gliding Kite flying Kite skating Sand-yachting or cart sailing</p>

2. Looking at the table of ***disturbance categories*** are there any that you would **NOT** consider to be an issue at your sites?
 - Prompt: Are there any disturbance categories that never occur at your sites?
 - Prompt: Do some disturbance categories rarely occur at your sites?
3. Thinking about all the different habitats that are used by shorebirds at your sites, are there any ***types of disturbances*** that you have encountered that are missing from the list?
 - Prompt: Are there disturbance types that occur at non-beach CWC sites that are not captured in this table?
 - Prompt: Is the table inclusive of all disturbance categories faced by shorebirds at your sites?
 - Prompt: Thinking about your sites, have you witnessed disturbances that should be added to the table?
 - Prompt: Are there different ways that people use shorebird habitats at your sites that are not shown on the table?

Great, thank you everyone for sharing that information about human disturbance activities.

Next, we would like to know how human disturbance is monitored at your sites, if at all. When we use the term “monitoring” we are referring to someone recording or noting any human disturbance event at the site.

A formal approach to monitoring would be filling out a survey that specifically asks about human disturbance events present at a site, while an informal approach would be someone making a note in their field data or recording a disturbance event on a survey without being prompted to.

4. Are there any types of formal or informal protocols for monitoring human disturbance at your sites?
 - What formal protocols do you all use?
 - Does anyone informally monitor human disturbance and if so, how?

Thank you for telling us all of that information about monitoring human disturbance. Next, we are interested to learn about ways to improve human disturbance management at your sites.

5. Are there any resources that would improve your efforts to reduce human disturbance at the sites you monitor?
 - Are there ways that BirdsCaribbean could better support you?

- Is there any information or resources that BirdsCaribbean could provide to help reduce disturbances to shorebirds at your sites?

Lastly, we would like to know about pro-environmental behaviors that people at CWC sites could do to help reduce human disturbance. When we say pro-environmental behaviors, we mean behaviors that, if adopted by the public, would benefit shorebirds. These behaviors would be voluntary actions that people would do on their own without being forced to by any laws or individuals.

When we think about asking people to voluntarily engage in a behavior, research shows that it can be more effective to request an action in a positive manner rather than using negative words such as “Do not” or “Keep away.” So, for my next question, I’d like to ask you to keep this in mind.

6. For this next question, I’d like to know if there are any pro-environmental behaviors to reduce human disturbance that should be promoted at your sites? And again, keep in mind the variety of habitat types that are used by shorebirds at CWC sites.
 - Prompt: What are some actions that people at CWC sites could take to minimize the disturbances that we have talked about today such as [insert some of the disturbances discussed by the group]
 - Prompt: Is there a way for people at your sites to have less of an impact on shorebirds?

Closing

That was our final question to discuss; our meeting has come to an end. During the next month, we will review the results from today’s focus group and use it to create a survey. We may also contact you to take part in that survey. If you are interested in the results from the focus group or survey, please let us know and we will be happy to provide you with information on the outcome of this project. I’d like to thank everyone again for taking part in this focus group and for contributing to this project. If anyone has any additional comments or questions, we will stay online for a few more minutes.

Appendix C: Focus Group codes, code descriptions, and example quotes

Parent Code	Parent Code Description	Child Code	Child Code Description	Example Quotes
Human disturbance definition	Monitors describe the phrase “human disturbance to shorebirds” as it relates to their CWC sites in the Caribbean. They discuss if they agree or disagree with the definition developed by Mengak and Dayer (2020) and specify ways that the definition could be revised to fit the context of their CWC sites in the Caribbean.	Agreement	Agreement with the definition of human disturbance developed by Mengak and Dayer (2020).	“It's similar.”
		New element	New element to add to the definition of human disturbance developed by Mengak and Dayer (2020).	“We could add human-induced to the definition.”
Potential human disturbances	Monitors describe potential human disturbances that occur at their CWC sites and/or compare the activities at their sites to the list of activities developed by Mengak and Dayer (2020).	Disturbances from the list and present at CWC sites.	Potential human disturbances [from the list developed by Mengak and Dayer (2020)] that are present at CWC sites.	Participant 1: “You do have ATVs issues with ATVs, right? Driving around in mudflats where Snowy Plovers nest?” Participant 2: “Yes”
		Disturbances from the list and not present at CWC sites.	Potential human disturbances [from the list developed by Mengak and Dayer (2020)] that	“We don't have any, um, wind powered aircraft.”

			are not present at CWC sites.	
		Disturbances missing from the list and present at CWC sites.	Potential human disturbances that are missing from the list developed by Mengak and Dayer 2020 and are present at CWC sites.	“We have like a serious, serious, illegal dumping problem with all of the wetlands that we are monitoring.”
		Various salt mining terms	Monitors describe several terms for salt mining.	“That's pretty much what salt picking is, but I think we just need to get the wording right. So clearly, it's called different things in different islands. Um, yeah, so on Grenada, I think on the, on the Grenadines, maybe they call it salt picking and other islands it would be called something else. It's kind of artisanal small-scale salt production.”
		Keep all disturbances	Monitors suggest keeping all potential human disturbances from the list developed by Mengak and Dayer 2020	“I wanted to add that if the survey is gonna be used throughout all the region, it's better to have all the disturbances. Some islands may not have some of these disturbances, but others may like ATVs, so maybe it's better to have them all.”

Monitoring protocols	Monitors describe systematic or informal approaches to monitoring human disturbance to shorebirds at their CWC sites.	Systematic monitoring	Monitors describe systematic approaches for collecting data on human disturbance to shorebirds.	“So CWC does have a form where you can describe disturbances.”
		Informal monitoring	Monitors describe informal approaches for collecting data on human disturbance to shorebirds.	“If we only have a day to go through a particular site and the sites vary, then it's a quick, um, basically presence/absence, and then you record everything that you see, and then you write that up.”
Resource needs	Monitors describe resources that are needed to monitor and/or manage potential human disturbance at their sites.	Training on interacting and working with other entities	Monitors describe the need for training on how to work with and interact with other agencies and/or enforcers to enhance human disturbance monitoring and management.	“Some resources to help us to get to [and reach out to] those, uh, those [enforcement] agencies to do presentations for them.
		Equipment	Monitors describe equipment needed to help them monitor and manage potential human disturbances.	“Among the resources it will be good to have signs.”
		Money	Monitors describe the need for money to help them monitor and manage potential	“There is not enough money to do big education campaigns to really make a change in the communities.”

			human disturbances.	
Behaviors to promote	Monitors describe behaviors that could be promoted to help reduce human disturbance to shorebirds	Education	Monitors describe education as a tool for reducing human disturbance to shorebirds	“Educating the local community about their pets and proper pet management is extremely important.”
		Work with the hotel industry	Monitors describe working with the hotel industry as an approach for reducing human disturbance to shorebirds	“Has anybody looked into working with, um, the, any of the hotel industry hotelier to hire persons who are, who are birders and taking, uh, groups out to sites to do birding and they get paid to take them out as part of some type of relationship between hotel or even having hotels like adopt a wetland or something of that?”
		Add trash cans	Monitors describe adding trash cans as an approach for reducing human disturbance to shorebirds	Other actions like adding trash cans
		Engage local communities	Monitors describe engaging local communities as a way to reduce human disturbance to shorebirds	“What we are working on and would like to continue working on is to link more communities, more people from the communities that live there.”

		Engage governments	Monitors describe engaging governments as a way to reduce human disturbance to shorebirds	“In addition to engaging the local communities, then they will also like to engage the government because they don't even have, uh, guards or forest guards in these parks.”
Constraints to reducing disturbance	Monitors describe factors that prevent them from managing human disturbance to shorebirds at their CWC sites.	Lack of cooperation from local businesses	Monitors describe the lack of cooperation from local business as a constraint to reducing human disturbance to shorebirds at their CWC sites.	“We have tried to talk it over with the owners of the companies. We have two companies guilty and they are refusing to create another way or another road or other places.”
		Lack of government support	Monitors describe the lack of government support as a constraint to reducing human disturbance to shorebirds at their CWC sites.	“There is no official support from the government to engage communities or educate them. And this is such a huge problem.”
		Poverty	Monitors describe poverty as a constraint to reducing human disturbance to shorebirds at their CWC sites.	“Very difficult situation right now. And people need profit to live, so there are no concerns about saving the birds. They're just needing money at this moment to survive.”
		Political issues	Monitors describe political issues as a constraint to	“And everything is so political that if the owners of these

			reducing human disturbance to shorebirds at their CWC sites.	businesses are friends to the, to the politics, politicians, they are never gonna change anything.”
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Appendix D: Survey Recruitment Emails

First Survey Recruitment Email

English/Inglés/Anglais:

Subject: Your Thoughts Requested about Shorebird Disturbance for BirdsCaribbean

Dear [insert name],

BirdsCaribbean has been working in collaboration with Virginia Tech to learn how human disturbance to shorebirds is monitored and managed at Caribbean Waterbird Census (CWC) sites. Through our collaborative work, BirdsCaribbean hopes to better support CWC sites in their future efforts to reduce human disturbances to shorebirds. Please consider taking the survey described below in English, Spanish, or French. We appreciate your participation!

La versión española de este mensaje se encuentra justo después de la versión inglesa. La versión française de ce message se trouve après la version espagnole.

Best,
Lisa Sorenson
Executive Director, BirdsCaribbean

Spanish/Español/Espagnol

Asunto: Se solicita su opinión sobre la perturbación de aves costeras en BirdsCaribbean

Estimado [insert name],

BirdsCaribbean ha estado trabajando en colaboración con Virginia Tech para aprender cómo se monitorean y manejan las perturbaciones humanas a las aves playeras en los sitios del Censo de Aves Acuáticas del Caribe (CWC). A través de nuestro trabajo colaborativo, BirdsCaribbean espera apoyar mejor a los sitios CWC en sus esfuerzos futuros para reducir las perturbaciones humanas a las aves playeras. Por favor, considere realizar la encuesta descrita a continuación en inglés, español o francés. Agradecemos su participación.

La mejor,
Lisa Sorenson
Directora Ejecutiva, BirdsCaribbean

French/Francés/Français:

Objet : Vos réflexions sur le dérangement des oiseaux de rivage sont demandées pour BirdsCaribbean

Cher [insert name],

BirdsCaribbean a travaillé en collaboration avec Virginia Tech pour savoir comment les perturbations humaines sur les oiseaux de rivage sont surveillées et gérées dans les sites du Caribbean Waterbird Census (CWC). Grâce à notre travail de collaboration, BirdsCaribbean espère mieux soutenir les sites CWC dans leurs efforts futurs pour réduire les perturbations humaines sur les oiseaux de rivage. Veuillez envisager de répondre à l'enquête décrite ci-dessous en anglais, en espagnol ou en français. Nous apprécions votre participation !

Meilleur,
Lisa Sorenson
Directrice exécutive, BirdsCaribbean

English/Inglés/Anglais:

Dear [insert name],

We would like to invite you to take a survey to understand any challenges you have experienced with human disturbance to shorebirds. You have been selected to take this survey because you monitor shorebirds through the Caribbean Waterbird Census (CWC).

Your responses to the survey will be very important for better management and monitoring at CWC sites and will help direct the efforts of BirdsCaribbean. This research will also contribute to a report, webinar, and scientific journal article.

The link to the survey is here. <SURVEY_LINK> Click the link to begin the survey.

This survey should take approximately 30 minutes to complete. You may start the survey and pause it if you need to complete it at a later time. Your answers will not be lost and you will be able to continue the survey where you left off.

If you do not have experience as a CWC monitor or are not 18 or older, please let us know so we can remove you from further email correspondence.

This project is being conducted by Virginia Tech, with support from BirdsCaribbean and Environment and Climate Change Canada. Taking part in this survey is voluntary, and your identity will be kept confidential. There are no known risks associated with this project.

For questions or concerns about this project, please contact Carolyn Comber at ccomber1@vt.edu.

Thank you in advance for your time!

Sincerely,
Carolyn Comber
Research Associate
Virginia Tech
Department of Fish and Wildlife Conservation

Ashley A. Dayer, Ph.D.
Associate Professor
Virginia Tech
Department of Fish and Wildlife Conservation

Spanish/Español/Espagnol

Estimado [insert name],

Nos gustaría invitarle a participar en una encuesta para conocer los problemas que ha experimentado con la perturbación humana de las aves playeras. Usted ha sido seleccionado para realizar esta encuesta porque monitorea aves playeras a través del Censo de Aves Acuáticas del Caribe (CWC).

Sus respuestas a la encuesta serán muy importantes para un mejor manejo y monitoreo en los sitios del CWC y ayudarán a dirigir los esfuerzos de BirdsCaribbean. Esta investigación también contribuirá a la elaboración de un informe, un seminario web y un artículo en una revista científica.

El enlace a la encuesta está aquí. <SURVEY_LINK> Haga clic en el enlace para comenzar la encuesta.

Esta encuesta debe tomar aproximadamente 30 minutos para completar. Puede iniciar la encuesta y pausarla si necesita completarla en otro momento. Sus respuestas no se perderán y podrá continuar la encuesta donde la dejó.

Si no tiene experiencia como monitor de CWC o no es mayor de 18 años, por favor háganoslo saber para que podamos eliminarle de la correspondencia posterior por correo electrónico.

Este proyecto lo lleva a cabo Virginia Tech, con el apoyo de BirdsCaribbean y Environment and Climate Change Canada. La participación en esta encuesta es

voluntaria y su identidad se mantendrá confidencial. No se conocen riesgos asociados a este proyecto.

Si tiene preguntas o dudas sobre este proyecto, póngase en contacto con Carolyn Comber en ccomber1@vt.edu.

Gracias de antemano por su tiempo.

Atentamente,
Carolyn Comber
Investigadora asociada
Virginia Tech
Departamento de Conservación de la Pesca y la Vida Silvestre

Dra. Ashley A. Dayer
Profesora asociada
Virginia Tech
Departamento de Conservación de la Pesca y la Fauna Silvestre

French/Francés/Français:

Cher [insert name],

Nous aimerions vous inviter à répondre à une enquête afin de comprendre les problèmes que vous avez rencontrés en ce qui concerne les perturbations humaines sur les oiseaux de rivage. Vous avez été sélectionné pour répondre à cette enquête parce que vous surveillez les oiseaux de rivage dans le cadre du Recensement des oiseaux d'eau des Caraïbes (CWC).

Vos réponses à l'enquête seront très importantes pour améliorer la gestion et la surveillance des sites du CWC et aideront à orienter les efforts de BirdsCaribbean. Cette recherche contribuera également à la rédaction d'un rapport, d'un webinaire et d'un article de journal scientifique.

Le lien vers l'enquête est ici. <SURVEY_LINK> Cliquez sur le lien pour commencer l'enquête.

Il vous faudra environ 30 minutes pour répondre à l'enquête. Vous pouvez commencer l'enquête et l'interrompre si vous souhaitez la terminer plus tard. Vos réponses ne seront pas perdues et vous pourrez reprendre l'enquête là où vous l'avez laissée.

Si vous n'avez pas d'expérience en tant qu'observateur de la CWC ou si vous n'avez pas 18 ans ou plus, veuillez nous le faire savoir afin que nous puissions vous exclure de toute correspondance électronique ultérieure.

Ce projet est mené par Virginia Tech, avec le soutien de BirdsCaribbean et d'Environnement et Changement Climatique Canada. La participation à cette enquête est volontaire et votre identité restera confidentielle. Il n'y a pas de risques connus associés à ce projet.

Pour toute question ou préoccupation concernant ce projet, veuillez contacter Carolyn Comber à l'adresse ccomber1@vt.edu.

Nous vous remercions à l'avance pour le temps que vous nous avez accordé !

Je vous prie d'agréer, Madame, Monsieur, l'expression de mes salutations distinguées,
Carolyn Comber
Associée de recherche
Virginia Tech
Département de la conservation des poissons et de la faune

Ashley A. Dayer, Ph.D.
Professeur associé
Virginia Tech
Département de la conservation du poisson et de la faune

Second Survey Recruitment Email

English/Inglés/Anglais:

Subject: REMINDER – Subject: Your Thoughts Requested about Shorebird Disturbance for BirdsCaribbean

Dear [insert name],

We recently sent you an email asking you to take part in an effort to help BirdsCaribbean better support you in any challenges you have experienced with human disturbance to shorebirds. You have been selected to take this survey because you monitor shorebirds through the Caribbean Waterbird Census (CWC). We would like to remind you of our request for your participation.

We ask that you complete the survey by [insert date].

The link to the survey is here. Click the link to begin the survey.

This survey should take approximately 30 minutes to complete. You may start the survey and pause it if you need to complete it at a later time. Your answers will not be lost and you will be able to continue the survey where you left off.

If you do not have experience monitoring shorebirds at CWC sites, please inform me via email, and I will make sure the survey and reminders are sent to the appropriate person.

We appreciate your contribution to this effort. Please let us know if you have any questions or concerns.

Sincerely,

Carolyn Comber
Research Associate
Virginia Tech
Department of Fish and Wildlife Conservation

Ashley A. Dayer, Ph.D.
Associate Professor
Virginia Tech
Department of Fish and Wildlife Conservation

Spanish/Español/Espagnol

Asunto: RECORDATORIO - Asunto: Se solicita su opinión sobre la perturbación de aves costeras en BirdsCaribbean

Estimado [insertar nombre],

Recientemente le enviamos un correo electrónico pidiéndole que participara en un esfuerzo para ayudar a BirdsCaribbean a apoyarle mejor en cualquier desafío que haya experimentado con la perturbación humana de las aves playeras. Usted ha sido seleccionado para participar en esta encuesta porque monitorea aves playeras a través del Censo de Aves Acuáticas del Caribe (CWC). Nos gustaría recordarle nuestra solicitud de participación.

Le pedimos que complete la encuesta antes del [insertar fecha].

El enlace a la encuesta está aquí. Haga clic en el enlace para comenzar la encuesta.

La encuesta durará aproximadamente 30 minutos. Puede iniciar la encuesta y detenerla si necesita completarla más tarde. Sus respuestas no se perderán y podrá continuar la encuesta donde la dejó.

Si usted no tiene experiencia en el seguimiento de aves playeras en los sitios CWC, por favor infórmeme por correo electrónico, y me aseguraré de que la encuesta y los recordatorios se envíen a la persona adecuada.

Agradecemos su contribución a este esfuerzo. Por favor, háganos saber si tiene alguna pregunta o inquietud.

Atentamente,

Carolyn Comber
Investigadora Asociada
Virginia Tech
Departamento de Conservación de la Pesca y la Vida Silvestre

Dra. Ashley A. Dayer
Profesora asociada
Virginia Tech
Departamento de Conservación de la Pesca y la Vida Silvestre

French/Francés/Français:

Objet : RAPPEL - Objet : Vos réflexions sur le dérangement des oiseaux de rivage sont demandées pour BirdsCaribbean

Cher [insérer le nom],

Nous vous avons récemment envoyé un courriel vous demandant de participer à un effort visant à aider BirdsCaribbean à mieux vous soutenir dans les défis que vous avez rencontrés en matière de perturbation des oiseaux de rivage par l'homme. Vous avez été sélectionné pour participer à cette enquête parce que vous surveillez les oiseaux de rivage dans le cadre du Caribbean Waterbird Census (CWC). Nous aimerions vous rappeler notre demande de participation.

Nous vous demandons de répondre à l'enquête avant le [insérer la date].

Le lien vers l'enquête est ici. Cliquez sur le lien pour commencer l'enquête.

L'enquête devrait durer environ 30 minutes. Vous pouvez commencer l'enquête et l'interrompre si vous devez la terminer plus tard. Vos réponses ne seront pas perdues et vous pourrez reprendre l'enquête là où vous l'avez laissée.

Si vous n'avez pas d'expérience dans le suivi des oiseaux de rivage sur les sites du CWC, veuillez m'en informer par courriel et je veillerai à ce que l'enquête et les rappels soient envoyés à la personne appropriée.

Nous apprécions votre contribution à cet effort. N'hésitez pas à nous faire part de vos questions ou préoccupations.

Je vous prie d'agr er, Madame, Monsieur, l'expression de mes salutations distingu es,

Carolyn Comber
Associ e de recherche
Virginia Tech
D partement de la conservation des poissons et de la faune

Ashley A. Dayer, Ph.D.
Professeur associ e
Virginia Tech
D partement de la conservation des poissons et de la faune

Third Survey Recruitment Email

English/Ingl s/Anglais:

Subject: REMINDER – Subject: Thoughts about Shorebird Disturbance for BirdsCaribbean

Dear [insert name],

As we mentioned in previous emails, Virginia Tech is conducting an effort to help BirdsCaribbean better support you in any challenges you have experienced with human disturbance to shorebirds. While we have heard from many Caribbean Waterbird Census (CWC) monitors, we are extending the survey deadline to ensure that you still have time to take the survey. Our ability to improvement human disturbance management at CWC sites depends on hearing from those who have not yet completed the survey.

We ask that you complete the survey by [insert date].

The link to the survey is here. Click the link to begin the survey.

We appreciate your contribution to this effort. Please let us know if you have any questions or concerns.

Sincerely,

Carolyn Comber
Research Associate
Virginia Tech
Department of Fish and Wildlife Conservation

Ashley A. Dayer, Ph.D.
Associate Professor
Virginia Tech
Department of Fish and Wildlife Conservation

Spanish/Español/Espagnol

Asunto: RECORDATORIO - Asunto: Reflexiones sobre la perturbación de aves costeras para BirdsCaribbean

Estimado [insertar nombre],

Como mencionamos en correos electrónicos anteriores, Virginia Tech está llevando a cabo un esfuerzo para ayudar a BirdsCaribbean a apoyarle mejor en cualquier desafío que haya experimentado con la perturbación humana de las aves playeras. Aunque hemos tenido noticias de muchos monitores del Censo de Aves Acuáticas del Caribe (CWC), estamos ampliando el plazo de la encuesta para asegurarnos de que aún tiene tiempo de realizarla. Nuestra capacidad para mejorar la gestión de las perturbaciones humanas en los sitios del CWC depende de las respuestas de aquellos que aún no han completado la encuesta.

Le pedimos que complete la encuesta antes del [insertar fecha].

El enlace a la encuesta está aquí. Haga clic en el enlace para comenzar la encuesta.

Agradecemos su contribución a este esfuerzo. Por favor, háganos saber si tiene alguna pregunta o inquietud.

Atentamente,

Carolyn Comber
Investigadora Asociada
Virginia Tech
Departamento de Conservación de la Pesca y la Vida Silvestre

Dra. Ashley A. Dayer
Profesora asociada
Virginia Tech
Departamento de Conservación de la Pesca y la Fauna Silvestre

French/Francés/Français:

Objet : RAPPEL - Objet : Réflexions sur le dérangement des oiseaux de rivage pour BirdsCaribbean

Cher [insérer le nom],

Comme nous l'avons mentionné dans des courriels précédents, Virginia Tech mène une action visant à aider BirdsCaribbean à mieux vous soutenir dans les défis que vous avez rencontrés en ce qui concerne les perturbations humaines sur les oiseaux de rivage. Bien que nous ayons reçu des nouvelles de nombreux observateurs du Caribbean Waterbird Census (CWC), nous prolongeons la date limite de l'enquête afin de nous assurer que vous avez encore le temps de participer à l'enquête. Notre capacité à améliorer la gestion des perturbations humaines sur les sites du CWC dépend de l'avis de ceux qui n'ont pas encore répondu à l'enquête.

Nous vous demandons de répondre à l'enquête avant le [insérer la date].

Le lien vers l'enquête est ici. Cliquez sur le lien pour commencer l'enquête.

Nous apprécions votre contribution à cet effort. N'hésitez pas à nous faire part de vos questions ou préoccupations.

Je vous prie d'agréer, Madame, Monsieur, l'expression de mes salutations distinguées,

Carolyn Comber
Associée de recherche
Virginia Tech
Département de la conservation des poissons et de la faune

Ashley A. Dayer, Ph.D.
Professeur associé
Virginia Tech
Département de la conservation du poisson et de la faune

Appendix E: Survey



This survey aims to explore human disturbances to shorebirds at Caribbean Waterbird Census (CWC) sites for the purpose of improving how BirdsCaribbean works with CWC sites to address human disturbance. This questionnaire may take about 20-30 minutes to complete. This survey is voluntary, and your identity will be kept confidential. There are no known risks associated with taking this survey.

For questions or concerns, please contact Carolyn Comber at ccomber1@vt.edu

* Do you consent to take this survey?

Yes

No

Before we begin, we offer this **definition of human disturbance to shorebirds:**

Human disturbance to shorebirds is an anthropogenic human activity, or human-induced activity, that directly or indirectly 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.

* As you take this survey, we would like you to answer questions based on your experience with **monitoring and managing human disturbance to shorebirds** at a CWC site in the Caribbean that you have visited the most frequently in the last five years. If no single site stands out as visiting it most frequently, then please tell us the name of the site that you have visited the most frequently and most recently.

Could you tell us **the name of the CWC site in the Caribbean that you have visited the most frequently in the last five years** and will refer to when answering the survey?

First, we would like to learn how human disturbance to shorebirds is monitored at \${Site Name}. To start off, we offer these definitions related to human disturbance monitoring.

When we use the term **monitoring**, we mean observing and recording evidence of human disturbance activities or events.

Monitoring can be **systematic**, meaning you use a protocol or survey to guide you through a formal process for conducting observations and gathering data on human disturbance activities or events near shorebirds.

Monitoring can also be **informal**, meaning you incidentally observe human disturbance activities, events, or evidence of disturbance while doing other tasks such as a point count survey. In some cases, you may record your observations in a field notebook or on a data sheet.

* In the last five years, have **systematic protocols** (e.g., Caribbean Waterbird Census data sheet,

International Shorebird Survey, etc.) been used to monitor human disturbance to shorebirds at \${Site Name}?

- Yes
- No

What **systematic protocols** have been used to monitor human disturbance to shorebirds at \${Site Name}? Please select all that apply.

- Caribbean Waterbird Census (CWC) data sheet
- Caribbean Waterbird Census (CWC) site description form
- International Shorebird Survey (ISS)
- Agency specific protocol
- Other (please specify)

During which months have **systematic protocols** been used to monitor human disturbance activities or events at \${Site Name}? Please select all that apply.

- January
- February
- March
- April
- May
- June
- July
- August
- September

- October
- November
- December

* In the last five years, have **informal observations** of human disturbance activities or events (e.g., footprints in the sand, dumped trash, people walking in wetlands) been recorded at \${Site Name}?

- Yes
- No

During which months have **informal observations** of human disturbance activities or events been recorded at \${Site Name}? Please select all that apply.

- January
- February
- March
- April
- May
- June
- July
- August
- September
- October
- November
- December

* For the next part of the survey, we would like to learn how human disturbance to shorebirds is **managed** at \${Site Name}.

Does \${Site Name} have **completely or partially closed areas** at some point during the year to protect shorebirds from human disturbance?

Yes

No

During which months does \${Site Name} have **completely or partially closed areas** to protect shorebirds from human disturbance?

Please select all that apply.

January

February

March

April

May

June

July

August

September

October

November

December

How is information about closed areas **communicated** at \${Site Name}?

Please select all that apply.

- Fencing
- Signage
- Website
- Television
- Radio
- Newspaper/magazine
- Informal conversations with the public
- Brochure
- Other (please specify)

Next, we would like to learn about **management practices** for reducing human disturbance to shorebirds.

Based on your experience and/or data, to what extent are the following management practices **effective at reducing human disturbances** to shorebirds at \${Site Name}? If a management practice does not occur at \${Site Name}, please select "Not applicable to site."

	Very effective	Somewhat effective	Neither effective nor ineffective	Somewhat ineffective	Very ineffective	Not applicable to site
Informal outreach (by staff and volunteers during monitoring)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Outreach/interpretation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Informational materials (brochures, fliers, activity pages)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Law enforcement	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Community engagement/

stewardship (volunteer dog monitors, education docents, citizen science)

Fencing only (symbolic fencing [posts with string], metal wire, snow fence)

Signs only (official postings, interpretive kiosks)

Fencing and signs together

What resources would help **improve efforts** to reduce human disturbance to shorebirds at \${Site Name}? Please select all that apply.

- Training on methods for monitoring human disturbance to shorebirds
- Training on methods for managing human disturbance to shorebirds
- Training on how to work with other organizations or agencies
- Training on how to interact with the public
- Staff (non-law enforcement)
- Law enforcement staff
- Volunteers
- Funding for needs that aren't personnel related (e.g., equipment, signs, trail cameras, etc.)
- Biological information on the impacts of human disturbance to shorebirds
- Social science information related to managing human disturbance to shorebirds
- Other (please specify)

We would like to know what you think are the **greatest threats to shorebird conservation** at \${Site Name}.

Reorder the items below by dragging them so that the **most threatening item is listed at the top** and the **least threatening item is listed at the bottom**. If an item is not considered a threat at \${Site Name}, do not include it in your ranking.

Drag your choices here to rank them

Climate change and severe weather (hurricanes, drought, floods, rising sea level, high temperatures, fire, coral bleaching)

Human disturbance (direct or indirect human activities or human induced activities)

Invasive species (e.g., non-native plants or animals that harm humans or the environment)

Predation (by native species and feral or domesticated animals)

Residential and commercial development

Agriculture (livestock grazing, marijuana cultivation, small cultivation, forestry, fuelwood, orchards)

Energy production and mining (mining, power stations, utility and service lines, cell towers)

Transportation and utilities (roads, off-road traffic, shipping channels, heavy boat traffic)

Over-exploitation, persecution, and control of species (selective harvest, egg collection, harvest of protected/threatened species)

Modification of natural ecosystems (fire control, dredging, draining, construction, development, coastal engineering)

Pollution (sewage, solid waste, plastic, industrial waste, pesticides, fertilizers, oil, noise, light)

Geological events (volcanic eruptions, earthquakes, mudslides, tsunamis)

There are a variety of human activities that may cause disturbance. A range of considerations determine whether these activities are allowed. Despite best efforts, some human activities that are restricted may still occur at sites even if they are not permitted. We would like to learn more about the legal and illegal human activities that occur at \${Site Name}.

Within the last five years, which **human activities have been known to occur either legally or illegally** at \${Site Name}? Please select all that apply.

- Agriculture** (people working on agricultural land in/around wetland)
- Beach raking/cleaning** (manually or mechanically with equipment)
- Cats** (domestic, feral)
- Direct harassment** (actively chasing birds, disturbing or destroying nests)
- Dogs** (leashed, unleashed, feral)
- Driving** (4x4, All Terrain Vehicles [ATV])
- Dumping** (trash, litter, plastic pollution)

- Events** (fishing tournaments, festivals, parties, sport competitions, fireworks)
- Fishing** (recreational, commercial, aquaculture)
- General beachgoing** (walking, running, beach games, sunbathing, picnicking, swimming)
- Harvesting resources** (seaweed, wood, grasses, bait collection, sand, salt production)
- Hunting** (legal or illegal hunting, trapping, hunting with dogs, shorebird by-catch from trapping other wildlife)
- Livestock** (untethered/free roaming livestock e.g., pigs, cattle, goats)
- Manned aircraft** (helicopters, low-flying planes, jet planes)
- Motorized watersports** (boats, airboats, speedboats, jet-skis)
- Non-motorized watersports** (kayaking, paddleboarding, sailing, kite surfing, wind surfing)
- Outdoor recreation** (non-beach activities; hiking, biking, horseback riding, camping)
- Shellfishing** (clamming, crabbing, oyster racks, shrimping)
- Tours** (boat tours, walking tours, mangrove tours)
- Unmanned aircraft** (drones, model aircraft, rocket launches)
- Wildlife observation** (birdwatching, wildlife viewing, research, nature photography)
- Wind-powered aircraft** (paragliding, hang-gliding, kite flying, kite skating, sand-yachting)

Some activities may be restricted for the protection of shorebirds during the breeding season (April-June), the migration season (July-November), and/or the winter season (December-March). The level in which an activity is restricted can vary from partially restricted to completely restricted.

Please **select the season(s) in which each activity has some type of restriction**, if at all restricted at \${Site Name}. If the activity does not occur at \${Site Name}, please select "Not applicable to site."

	Never restricted	Breeding restrictions	Migration restrictions	Winter restrictions	Not applicable to site
Agriculture (people working on agricultural land in/around wetland)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Beach raking/cleaning (manually or mechanically with equipment)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cats (domestic, feral)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Direct harassment (actively chasing birds, disturbing or destroying nests)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dogs (leashed, unleashed, feral)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Driving (4x4, All Terrain Vehicles [ATV])	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dumping (trash, litter, plastic pollution)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Events (fishing tournaments, festivals, parties, sport competitions, fireworks)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fishing (recreational, commercial, aquaculture)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
General beachgoing (walking, running, beach games, sunbathing, picnicking, swimming)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Never restricted	Breeding restrictions	Migration restrictions	Winter restrictions	Not applicable to site
Harvesting resources (seaweed, wood, grasses, bait collection, sand, salt production)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hunting (legal or illegal hunting, trapping, hunting with dogs, shorebird by-catch from trapping other wildlife)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Livestock (untethered/free roaming livestock e.g., pigs, cattle, goats)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Manned aircraft (helicopters, low-flying planes, jet planes)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Motorized watersports (boats, airboats, speedboats, jet-skis)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Non-motorized watersports (kayaking, paddleboarding, sailing, kite surfing, wind surfing)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outdoor recreation (non-beach activities; hiking, biking, horseback riding, camping)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Shellfishing (clamming, crabbing, oyster racks, shrimping)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tours (boat tours, walking tours, mangrove tours)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Unmanned aircraft (drones, model aircraft, rocket launches)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Never restricted	Breeding restrictions	Migration restrictions	Winter restrictions	Not applicable to site
Wildlife observation (birdwatching, wildlife viewing, research, nature photography)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wind-powered aircraft (paragliding, hang-gliding, kite flying, kite skating, sand-yachting)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Many factors contribute to public **compliance** of restricted activities. When we say compliance, we are referring to **the act of obeying established guidelines, rules, or laws**. We would like to learn about public compliance for the activities listed below. There are no right or wrong answers.

Based on your experience and/or data from $\{Site Name\}$, to what extent is the public **compliant with restrictions related to the following activities** at $\{Site Name\}$? If the activity does not occur at $\{Site Name\}$, or if there are no restrictions related to the activity, please select "Not applicable to site."

		Neither compliant nor			Not applicable to site
Very compliant	Somewhat compliant	uncompliant	Somewhat uncompliant	Very uncompliant	

Agriculture (people working on agricultural land in/around wetland)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Beach raking/cleaning (manually or mechanically with equipment)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cats (domestic, feral)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Direct harassment (actively chasing birds, disturbing or destroying nests)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dogs (leashed, unleashed, feral)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Driving (4x4, All Terrain Vehicles [ATV])	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dumping (trash, litter, plastic pollution)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Events (fishing tournaments, festivals, parties, sport competitions, fireworks)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fishing (recreational, commercial, aquaculture)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
General beachgoing (walking, running, beach games, sunbathing, picnicking, swimming)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
			Neither compliant			Not applicable to site
	Very compliant	Somewhat compliant	nor uncompliant	Somewhat uncompliant	Very uncompliant	
Harvesting resources (seaweed, wood, grasses, bait collection, sand, salt production)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hunting (legal or illegal hunting, trapping, hunting with dogs, shorebird by-catch from trapping other wildlife)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Livestock (untethered/free roaming livestock e.g., pigs, cattle, goats)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Manned aircraft (helicopters, low-flying planes, jet planes)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Motorized watersports (boats, airboats, speedboats, jet-skis)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Non-motorized watersports

(kayaking, paddleboarding, sailing, kite surfing, wind surfing)

Outdoor recreation (non-beach activities; hiking, biking, horseback riding, camping)

Shellfishing (clamming, crabbing, oyster racks, shrimping)

Tours (boat tours, walking tours, mangrove tours)

Unmanned aircraft (drones, model aircraft, rocket launches)

		Neither compliant				
		Very compliant	Somewhat compliant	nor uncompliant	Somewhat uncompliant	Very uncompliant
						Not applicable to site

Wildlife observation

(birdwatching, wildlife viewing, research, nature photography)

Wind-powered aircraft

(paragliding, hang-gliding, kite flying, kite skating, sand-yachting)

Next, we would like to know your thoughts on **pro-environmental behaviors**. When we use the term pro-environmental behaviors, we are referring to behaviors that people could be encouraged to voluntarily do (without any laws or enforcers requiring the behavior) for the purpose of reducing human disturbance to shorebirds.

In your opinion, if people were to adopt the following behaviors, **how likely or unlikely** would it be for each behavior to reduce actual human disturbance to shorebirds at \${Site Name}?

If an activity is not permitted or does not occur at \${Site Name}, please select "Not applicable to site."

For example, if vehicles are not allowed, select "Not applicable to site" for the pro-environmental behavior, "Lower vehicle speed near shorebirds."

	Very likely	Somewhat likely	Neither likely nor unlikely	Somewhat unlikely	Very unlikely	Not applicable to site
Walk/run around shorebird flocks, rather than through flocks	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lower vehicle speed near shorebirds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lower boat speed near shorebirds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Leave a buffer zone around wetland areas when clearing land for agriculture	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tether livestock when they're near wetland areas	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use binoculars or a camera to see birds without getting too close	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Move slowly and quietly through wetlands	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Stay on designated trails when you're outdoors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Leave seaweed/wrack on the beach	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Keep cats indoors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Very likely	Somewhat likely	Neither likely nor unlikely	Somewhat unlikely	Very unlikely	Not applicable to site
Walk dogs on a leash	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Take unwanted pets to an animal shelter	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Put trash in trash cans	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Put plastic in recycling bins	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Paddle at a distance from shorebirds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Launch drones away from shorebirds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Applicability means the behavior is relevant for a group of individuals (e.g., "walking around shorebird flocks" would be "applicable" for the proportion of people who walk at a site).

For what proportion of people are the following behaviors applicable at $\{\text{Site Name}\}$?

	Nearly all the people	About 75% of people	About 50% of people	About 25% of people	Nearly none of the people	Not applicable to site
Walk/run around shorebird flocks, rather than through flocks	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lower vehicle speed near shorebirds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lower boat speed near shorebirds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Leave a buffer zone around wetland areas when clearing land for agriculture	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tether livestock when they're near wetland areas	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use binoculars or a camera to see birds without getting too close	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Move slowly and quietly through wetlands	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Stay on designated trails when you're outdoors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Leave seaweed/wrack on the beach	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Keep cats indoors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Nearly all the people	About 75% of people	About 50% of people	About 25% of people	Nearly none of the people	Not applicable to site
Walk dogs on a leash	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Take unwanted pets to an animal shelter	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Put trash in trash cans	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Put plastic in recycling bins	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Paddle at a distance from shorebirds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Launch drones away from shorebirds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Now we are interested in the **feasibility** of encouraging each behavior. Rate how likely or unlikely it would be to encourage people to do the following activities at \${Site Name}?

	Very likely	Somewhat likely	Neither likely nor unlikely	Somewhat unlikely	Very unlikely	Not applicable to site
Walk/run around shorebird flocks, rather than through flocks	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lower vehicle speed near shorebirds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lower boat speed near shorebirds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Leave a buffer zone around wetland areas when clearing land for agriculture	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tether livestock when they're near wetland areas	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use binoculars or a camera to see birds without getting too close	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Move slowly and quietly through wetlands	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Stay on designated trails when you're outdoors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Leave seaweed/wrack on the beach	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Keep cats indoors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Very likely	Somewhat likely	Neither likely nor unlikely	Somewhat unlikely	Very unlikely	Not applicable to site
Walk dogs on a leash	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Take unwanted pets to an animal shelter	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Put trash in trash cans	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Put plastic in recycling bins	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Paddle at a distance from shorebirds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Launch drones away from shorebirds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Next, we are interested in what **proportion** of people at \${Site Name} already complete these behaviors (e.g., the percent of people who walk around shorebird flocks). Please provide an estimate based on your experience at \${Site Name}.

	Nearly all the people	About 75% of people	About 50% of people	About 25% of people	Nearly none of the people	Not applicable to site
Walk/run around shorebird flocks, rather than through flocks	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lower vehicle speed near shorebirds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lower boat speed near shorebirds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Leave a buffer zone around wetland areas when clearing land for agriculture	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tether livestock when they're near wetland areas	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use binoculars or a camera to see birds without getting too close	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Move slowly and quietly through wetlands	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Stay on designated trails when you're outdoors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Leave seaweed/wrack on the beach	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Keep cats indoors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Nearly all the people	About 75% of people	About 50% of people	About 25% of people	Nearly none of the people	Not applicable to site
Walk dogs on a leash	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Take unwanted pets to an animal shelter	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Put trash in trash cans	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Put plastic in recycling bins	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Paddle at a distance from shorebirds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Launch drones away from shorebirds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Are there any other **pro-environmental behaviors** that people could voluntarily do to reduce human disturbance at \${Site Name}?

Lastly, we would like to know some information about the people at \${Site Name}.

Please select the types of staff at \${Site Name}.

- Full-time biologists
- Seasonal biologists
- Seasonal interns
- Seasonal technicians
- Full-time outreach coordinators
- Seasonal outreach coordinators
- Full-time law enforcement officers
- Seasonal law enforcement officers
- Volunteers
- No staff at site

Other (please specify)

What types of **shorebird habitat** exist at \${Site Name}? Please select all that apply.

- Marine (coral reef, seagrass bed, open sea, bay, strait)
- Sandy cay
- Sandy beach, berm, shoreline
- Rocky shore, strand
- Mudflat, sandflat
- Salt marsh
- Saline lagoon, salina, salt pond, salina, salt flat
- Tidal creek, estuary, lagoon
- Mangrove swamp
- Brackish lagoon, pond, lake
- Brackish marsh
- Swamp forest (Royal Palm, Pterocarpus)
- Freshwater marsh
- Freshwater pool (may be seasonally flooded), pond, lake, reservoir
- Stock, farm pond
- River, stream, canal, ditch
- Rice field, flooded farmland
- Sewage pond
- Other (please specify)

Which of the following **shorebird species** are at \${Site Name} on an annual basis (occurring each year)? Please select all that apply.

- White-rumped Sandpiper (*Calidris fuscicollis*)
- Red Knot (*Calidris canutus*)
- Sanderling (*Calidris alba*)
- Least Sandpiper (*Calidris minutilla*)
- Western Sandpiper (*Calidris mauri*)
- Pectoral Sandpiper (*Calidris melanotos*)
- Stilt Sandpiper (*Calidris himantopus*)
- Semipalmated Sandpiper (*Calidris pusilla*)
- Greater Yellowlegs (*Tringa melanoleuca*)
- Lesser Yellowlegs (*Tringa flavipes*)
- Solitary Sandpiper (*Tringa solitaria*)
- Willet (*Tringa semipalmata*)
- American Golden Plover (*Pluvialis dominica*)
- Black-bellied Plover (*Pluvialis squatarola*)
- Marbled Godwit (*Limosa fedoa*)
- Hudsonian Godwit (*Limosa haemastica*)
- Piping Plover (*Charadrius melodus*)
- Semipalmated Plover (*Charadrius semipalmatus*)
- Snowy Plover (*Charadrius nivosus*)
- Wilson's Plover (*Charadrius wilsonia*)
- Killdeer (*Charadrius vociferus*)

- Red-necked Phalarope (*Phalaropus lobatus*)
- Ruddy Turnstone (*Arenaria interpres*)
- Whimbrel (*Numenius phaeopus*)
- Black-necked Stilt (*Himantopus mexicanus*)
- Short-billed Dowitcher (*Limnodromus griseus*)
- Spotted Sandpiper (*Actitis macularius*)
- American Oystercatcher (*Haematopus palliatus*)

* In the future, we at Virginia Tech and BirdsCaribbean hope to work with a few sites across the Caribbean on behavior change campaigns to reduce disturbance. Sites that participate will receive some funding to aid in data collection, campaign design, and implementation.

Would you be interested in receiving information about future opportunities to participate in behavior change campaigns aimed at reducing human disturbance to shorebirds?

- Yes
- No

* Thanks for your interest. It's likely we won't be able to engage with all sites that are interested as there are some specific characteristics we need to meet. If we are able to consider your site, you should hear back from us in a few months. Regardless, we will certainly keep all those who express interest apprised of the work we do so you can learn from it.

Please enter your email address below to receive additional information.

Do you have any additional comments that you would like to add?