

# **Draft Compatibility Determination**

## **Title**

Draft Compatibility Determination for Wildlife Observation and Photography, Back Bay National Wildlife Refuge (NWR).

## **Refuge Use Category**

Wildlife Observation and Photography

## **Refuge Use Type(s)**

Photography/video/filming/audio recording, Photography/video/filming/audio recording (news and educational), Wildlife observation

## **Refuge**

Back Bay National Wildlife Refuge

## **Refuge Purpose(s) and Establishing and Acquisition Authority(ies)**

"... as a refuge and breeding ground for migratory birds and other wildlife. Executive Order 7907, dated June 6, 1938

"... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds."16 U.S.C. § 715d (Migratory Bird Conservation Act)

"... the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions ..." 16 U.S.C. § 3901(b) (Emergency Wetlands Resources Act of 1986)

## **National Wildlife Refuge System Mission**

The mission of the National Wildlife Refuge System, otherwise known as Refuge System, is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans (Pub. L. 105-57; 111 Stat. 1252).

## **Description of Use**

Is this an existing use?

Yes

This compatibility determination (CD) renews, updates, and combines the 2010

compatibility determinations for “Wildlife Observation, Photography, Environmental Education, and Interpretation”, “Walking/Hiking”, and “Bicycling” as included in the 2010 Back Bay NWR Comprehensive Conservation Plan, and focuses specifically on wildlife observation and photography with walking, jogging, hiking, backpacking and bicycling as a means to access these uses. This use is being reevaluated as required per policy after 10 years. The use is consistent with the Back Bay NWR 2010 Comprehensive Conservation Plan and associated Environmental Assessment and Finding of No Significant Impact (9-30-2010).

What is the use?

The uses are wildlife observation and photography.

Unmanned aircraft system (UAS/drone) flights are not permitted to launch, land or disturb wildlife on a National Wildlife Refuge in accordance with 50 CFR § 27.34 and 27.51. A separate UAS Finding of Appropriateness and CD would need to be prepared prior to permitting the public to use UAS on a refuge.

**Photography, video, filming, or audio recording.** Refuge visitation for the purpose of photographing refuge natural or cultural resources (including fish, wildlife, plants, and their habitats) or public uses of those resources (not for news, or educational purposes). Activity conducted by an individual or organization involving photography, videography, filming, or other recording of sight or sound.

**Photography, video, filming, or audio recording (news and educational).** Activity involving photography, videography, filming, or other recording of sight or sound for news, public information, or educational purposes.

**Wildlife observation** - Viewing of fish, wildlife, plants, or their habitats by refuge visitors.

Is the use a priority public use?

Yes

Where would the use be conducted?

Refuge Southeast Area-Public Use Zone: This area comprises approximately 280 acres and serves approximately 150,000 visitors annually. This area includes a Visitor Center (VC), interior and exterior interpretive displays, mounted wildlife viewing scopes, outdoor environmental education classroom and activity pier, pedestrian trail system, two boardwalks providing access to four miles of beach, canoe/kayak launch, wildlife viewing facility with interpretive displays, viewing scopes and adjacent restroom, and an entrance station with approximately one mile of entrance road that exists at the northern portion of the property. This zone also includes the wildlife viewing facility (mentioned above), located at the northern edge of the “C” Pool impoundment.

Refuge Southeast Area-Impoundment Zone: Comprising more than 900 acres of restored wetlands, this section of the refuge currently provides two dike roads that serve as trails through the refuge and provides wildlife viewing and photography opportunity. Visitors must pass through the refuge Southeast Area-Public Use Zone to access this zone. No public vehicle traffic or parking is permitted in this zone, excluding the two handicap parking spots for fishing access. This zone serves more than 20,000 visitors annually.

Refuge West Side: The Horn Point Canoe/Kayak Launch Facility provide wildlife observation and photography opportunities (please visit the refuge website for a map of the refuge: <https://www.fws.gov/refuge/back-bay>).

### When would the use be conducted?

Public access to all or a portion of the refuge's beach could be limited from April 1 to October 31 each year to reduce the likelihood of frequent disturbance to nesting or migrating shorebirds or other sensitive species of wildlife.

Refuge Southeast Area-Public Use Zone: Year-round, one-half hour before sunrise to one-half hour after sunset.

Refuge Southeast Area-Impoundment Zone: From April 1 through October 31, from one-half hour before sunrise to one-half hour after sunset. During this time, either the East Dike or West Dike will be open to the public. Public vehicle access/parking is prohibited year-round. The Southeast Area oceanfront beach remains open to these activities year-round, with exceptions listed above. The wildlife viewing facility remains open all year.

The impoundments provide undisturbed resting and feeding for migratory waterfowl during the winter migration; therefore, this area is closed to all public access from November 1 through March 31, with the exception of refuge and False Cape State Park led wildlife viewing tram trips. These tram trips are scheduled and managed cooperatively per a Memorandum of Understanding between the two entities which maintains access to the State Park while managing disturbances in this zone.

Refuge West Side: The Horn Point Canoe/Kayak Launch Facility is open from April 1 through October 31 annually.

Any refuge facilities and grounds may close for refuge management activities, safety, special events, or other program.

### How would the use be conducted?

The priority uses of wildlife observation and photography are permitted on established roads, trails, and in buildings that have been designed to accommodate such uses and in areas that are the least sensitive to human intrusion. Visitors may participate in these activities via walking, hiking, backpacking, jogging, and bicycling including e-bikes. Only foot traffic is allowed on hiking trails, with the exception of

the East and West Dike Trails when open, and the Beach Trail. Bicycles must adhere to the 15MPH speed limit. These uses are conducted for the general public, as well as for organized groups, including but not limited to, schools and scout groups. Groups of 10 or more require a Special Use Permit for these activities, and a seasonal entrance fee from April 1 through October 31 would be charged to all, with exceptions provided by the Refuge Manager. An example of an exception may include school groups.

Self-guided groups are those who wish to host their own wildlife observation activities. For self-guided groups of 10 or more, each request must be presented in writing with details of who, what, where, when, why, and how the group activity will be conducted. Each request will then be evaluated for impacts to the refuge. Using professional judgment, as long as there is no significant negative impact to natural resources or visitor services, or violation of refuge regulations, a Special Use Permit may be issued outlining the framework in which this use can be conducted.

Permits are required for filming or still photography parties of more than eight individuals. Filmmakers or photographers should submit a General Activity Special Use Permit application (FWS 3-1383 G) in writing to the refuge in advance. A fee may be charged for the special use permit. The fee is dependent on size, scope and impact of the proposed activity.

Permits are not required for filming or still photography parties of eight or fewer individuals, providing that the user who conducts the filming or still photography activity:

- A. does not impede or intrude on the experience of other visitors to the Federal land management unit;
- B. does not disturb or negatively impact—
  - i. a natural or cultural resource; or
  - ii. an environmental or scenic value; and
  - iii. allows for equitable allocation or use of facilities of the Federal land management unit.
- C. is located in an area in which the public is allowed.
- D. does not require the exclusive use of a site or area.
- E. is not located in an area that receives a very high volume of visitation.
- F. does not use a set or staging equipment, subject to the limitation that handheld equipment (such as a tripod, monopod, and handheld lighting equipment) shall not be considered staging equipment.
- G. complies with and adheres to visitor use policies, practices, and regulations applicable to the Service land management unit.

- H. is not likely to result in additional administrative costs being incurred by the Service with respect to the filming or still photography activity.
- I. complies with other applicable Federal, State (as defined in section 2 of the EXPLORE Act), and local laws (including regulations), including laws relating to the use of unmanned aerial equipment.

#### Why is this use being proposed or reevaluated?

The continued use is being proposed by the refuge to promote priority public uses of the National Wildlife Refuge System. If priority public uses are found compatible, they are to receive enhanced consideration over other secondary public uses.

### **Availability of Resources**

Wildlife observation and photography of natural and cultural resources occur through the use of existing staff, resources, and facilities. Existing resources such as interpretive kiosks/displays, and programs to the public, are made possible through extensive help of staff, volunteers, and partners. The amount of wildlife observation and photography programming provided to the public will be a direct reflection of the refuge's staff and funding levels and/or volunteer and partner capabilities.

The Refuge Manager or Project Leader will use sound professional judgement to determine the staffing needed to perform the functions necessary to ensure compatibility. Refuge staff are needed to administer activities such as visitor programs, maintaining trails and signage, issuing special use permits, and monitoring impacts related to wildlife observation and photography uses. The funding resources needed to provide this use are available under the current refuge budget. However, adequate levels of refuge staffing, funding, and facilities are necessary to administer this use in a manner that ensures continued compatibility (603 FW2 2.11(A.2)).

Therefore, if staffing levels or budgets decrease and alternate resources cannot be found to facilitate wildlife observation and photography activities, the Refuge Manager or Project Leader may need to re-evaluate whether these uses are still compatible with refuge purposes and the Service's mission.

In addition to the \$7,500 routine maintenance, we anticipate a total of approximately \$20,000 for the following one-time costs to administer this use and make small site improvements: approximately \$5,000 to purchase and install interpretive signs, and approximately \$15,000 for trail improvements.

### **Anticipated Impacts of the Use**

## Potential impacts of a proposed use on the refuge's purpose(s) and the Refuge System mission

The effects and impacts of the proposed use to refuge resources, whether adverse or beneficial, are those that are reasonably foreseeable and have a reasonably close causal relationship to the proposed use of wildlife observation and photography. This CD includes the written analyses of the environmental consequences on a resource only when the impacts on that resource could be more than negligible and, therefore, considered an “affected resource.” Resources that will not be more than negligibly impacted by the action, including geology, hydrology, air and water quality, threatened and endangered species, cultural resources, and socioeconomics have been dismissed from further analyses.

Wildlife observation and photography can result in varying impacts to wildlife resources, both positive and negative. These uses represent two of the big six priority public uses designated in the Refuge Improvement Act of 1997 (hunting, fishing, environmental education, interpretation, wildlife observation and photography). These wildlife-dependent uses promote public understanding and appreciation of the Refuge System. Recreational visitation and associated economic contributions made to local and state economies provide a powerful catalyst for conserving public lands (Marion 2019).

Damage to ecosystems is known to occur when informal trails are created and used by the public (Barros and Pickering 2017). Visitors engaging in wildlife observation and photography activities will be expected to stay on designated trails or roads and are not allowed to touch or remove wildlife from the refuge without the appropriate permit or license. Disturbances associated with these two public uses vary with the wildlife species present and the type, level, frequency, duration, and the time of year such activities occur.

### Short-term impacts

Short-term impacts resulting from anthropogenic disturbance from visitors engaging in wildlife observation and photography activities may include changes in wildlife behavior, distribution, or abundance (Leblond et al. 2013). Trails used to facilitate wildlife observation and photography can disturb wildlife outside the immediate trail corridor (Trails and Wildlife Task Force 1998, Miller et al. 2001). Noise caused by visitors engaging in wildlife observation and photography activities can result in increased levels of disturbance, though noise is not always correlated with visitor group size (Burger 1986, Klein 1993, Burger and Gochfeld 1998).

Extensive research has been conducted on the impacts of human disturbance on birds. Gutzwiller et al. (1994) found that the singing behavior of some species of songbirds was altered by low levels of human intrusion. Pedestrian travel has the potential to impact shorebirds, waterfowl, and other migratory birds feeding and

resting near the trails and on beaches, especially during the nesting and migration seasons. Birds may avoid places where people are present and when visitor activity is high (Burger 1981, 1986; Klein et al. 1995). Miller et al. (1998) found bird abundance and nesting activities (including nest success) increased as distance from a recreational trail increased in both grassland and forested habitats. Nest predation was also found to be greater near trails (Miller et al. 1998).

Wildlife observation and photography activities have the potential to impact fish and other aquatic species if activities generate noise in the water, increase turbidity, or result in other physical disturbance in the aquatic environment. For example, when exposed to noise events, bass and bull head fish spent less time guarding nests and fry exposing eggs and young to potential predators (MacLean et al. 2020, Maxwell et al. 2018, Mickle et al. 2018).

Human disturbance from wildlife observation and photography uses on the refuge also has potential short-term impacts on mammals. There is evidence to suggest that the mammal species most likely to be adversely affected by human disturbance are those for which available habitat is limited, constraining them to stay in disturbed areas and suffer the costs of reduced survival or reproductive success (Gill et al. 2001). For example, disturbances causing mammals to flee during winter months could consume stored fat reserves that are necessary to get through the winter. Additionally, George and Crooks (2006) found that bobcats and coyotes were more active at sites with less human use and less active at sites with high levels of human recreation. This study also found that bobcats were detected less frequently in high human use areas, and even temporarily shifted their activity patterns to become more nocturnal.

In addition to direct impacts on wildlife, wildlife observation and photography can also have indirect impacts on wildlife by altering vegetation and habitat on a short-term basis. Immediate effects can include soil compaction from trampling, changes to vegetation structure, and accumulating waste from litter. By altering these habitat characteristics, visitors can modify the food supply or availability of shelter for wildlife (Cole and Landres 1995). Modes of transportation along roads and foot traffic on trails and at established wildlife observation and photography sites can compact soil leading to increased erosion and sedimentation (Cooke and Xia 2020), resulting in degraded habitat for wildlife.

Quantitative research documenting the impacts of wildlife observation and photography uses on other user groups such as hunters and anglers is scant. Crowding from these uses may deter some recreationists; these individuals may alter their time or location of visitation or develop other coping mechanisms, such as rationalization or shifting their understanding of the activity or place (Manning and Valliere 2001, Marcouiller 2008). Potential positive impacts of wildlife observation and photography include a deepened sense of place, heightened appreciation for the refuge's habitat and wildlife, and inspired engagement in conservation efforts (Ardoin

2006, Kudryavtsev et al. 2012).

Many shorebirds that nest, migrate, or overwinter in the United States are in decline and are of conservation concern due to threats and pressures they experience throughout their annual cycle. Since 1970, shorebird abundance across North America has declined by 37 percent (Rosenberg et al. 2019) and those declines are accelerating over time (Smith et al. 2023). Human disturbance has been identified as a major threat and a key mortality source for shorebirds, especially in the Northeastern U.S. (AFSI 2015, NABCI 2022). Disturbance can be defined as “a human activity that causes an individual or group of shorebirds to alter their normal behavior, leading to an additional energy expenditure by the birds. It disrupts or prevents shorebirds from effectively using important habitats and from conducting the activities of their annual cycle that would occur in the absence of humans. Productivity and survival rates may also be reduced” (Mengak and Dayer 2020). Human disturbance can be caused by both intentional and unintentional actions, including wildlife observation and photography activities. Unfortunately, the impacts of disturbance will likely increase in the future as the human population in coastal areas is projected to grow (NOAA 2013) and as shorebird habitats decrease due to coastal development and sea-level rise driven by climate change (Galbraith et al. 2002).

Disturbance can impact shorebirds throughout the entire annual cycle. During the breeding season, disturbance can affect how shorebirds use habitat, as well as their reproductive success and survival. Human disturbance has been found to exclude shorebirds from habitat they would otherwise use for nesting and to cause adults to incubate or attend their nests less frequently, which can result in reproductive failure when nests are left unprotected from temperature fluctuations or predators (Lafferty et al. 2006, Sabine et al. 2008). Additionally, human activity can cause direct mortality of adults, chicks and eggs, such as trampling (Melvin et al. 1994, Ruhlen et al. 2003, Schulte and Simons 2015).

Disturbance during the non-breeding season, which involves a period of migration, can also have significant impacts on the survival and fitness of shorebirds. Migration is an energetically demanding activity that requires sufficient food resources and stopover sites where birds can rest and forage, and many such stopover sites occur in the Northeastern U.S. (Colwell 2010, Linscott and Senner 2021). Disturbance can cause shorebirds to fly away, displace them from important habitats, and reduce their foraging time and feeding rates (Burger and Gochfeld 1991, Burger and Niles 2014, Burger et al. 2004, Navedo et al. 2019, Pfister et al. 1992). The cumulative result of these impacts can be a severe energetic cost for individual birds, such as reduced body mass, and can lead to lower annual survival rates of individuals at disturbed sites (Gibson et al. 2018, Rogers et al. 2006). When extrinsic factors, such as disturbance, are experienced by shorebirds during the non-breeding season, their ability to reproduce during the breeding season can be influenced (Weithman et al. 2017).

Three species of sea turtles have been documented nesting on refuge beaches, the loggerhead sea turtle (*Caretta caretta*) Green turtle (*Chelonia mydas*) and Kemp's



ridley (*Lepidochelys kempii*). Leatherback sea turtles (*Dermochelys coriacea*) are seen passing through state waters as they migrate north along the Atlantic coast and feed in nearby Chesapeake Bay. Although there have been no leatherback nests documented in Virginia, they have been observed nesting in North Carolina nearly every year since 1998 (Virginia Department of Game and Inland Fisheries, 2017). All species of marine turtles that occur in Virginia are protected under the Endangered Species Act of 1973. Loggerhead and green sea turtles are listed as "threatened" and the Kemp's ridley and leatherback are listed as "endangered" under both federal and state law.

The majority of sea turtle nesting usually occurs between dusk and dawn hours in Virginia from May through September. Low levels of disturbance can deter nesting activity, to include human disturbance and lighting (Dodd 1988). Additionally, incubating nests and emerging hatchlings from nests located could be negatively impacted by daytime and nighttime beach activities.

Under the current management efforts, wildlife observation and photography have not had a significant impact on nesting sea turtles, sea turtle nests or emerging hatchlings. Refuge sea turtle management protocol dictates that early morning patrols are conducted during the nesting period (May through September) to locate sea turtle crawls and potential nests. When nests are located, their location is analyzed to determine whether it is high enough on the beach to ensure optimal success of the nest (e.g., above regular high tide line) and relocated when necessary. Nest areas are marked to ensure they are not disturbed during the incubation period. Therefore, should a nest be laid on the beach where visitors participate in wildlife observation and photography, it would be located well outside of the tide zone and properly marked. Hatchlings typically emerge an average of 60 days after being deposited, crawling from their nest to the ocean. This emergence usually occurs during the night hours in the months of July through September and would not be impacted by visitors between one-half hour before sunrise and one-half hour after sunset.

## Long-term impacts

The long-term effects of wildlife observation and photography activities on species will vary depending on their biology and life history. For example, the same wildlife programming offered during different seasons—for example, during breeding, migration, or wintering for migratory birds—may differ greatly in its impact. Examples include observation and photography programs causing birds to flush during nesting (Carney and Sydeman 1999) or causing mammals to flee during winter months, thereby consuming large amounts of stored fat reserves necessary for survival (Lovegrove 2005).

The presence of humans participating in wildlife observation and photography could also lead to human-induced avoidance by wildlife, which can prevent animals from using otherwise suitable habitat. Frequent disturbance may cause shifts in habitat

use, abandonment of habitat, and increased energy demands on affected wildlife as reviewed in Kerlinger et al. 2013. Hammitt and Cole (1998) conclude that the frequent presence of humans in wildland areas can dramatically change the normal behavior of wildlife mostly through “unintentional harassment” such as wildlife becoming habituated to humans.

Additional potential long-term impacts from wildlife observation and photography uses include changes at the community and ecosystem scale. Frequent use of areas or trails for wildlife observation and photography activities could alter species composition in the immediate areas utilized for these activities. For example, generalist bird species are typically more abundant near trails, whereas specialist species are less common (Miller et al. 1998).

There is a large amount of research available for the long-term impacts of human disturbance on bird species. Wildlife observation and photography programs that incorporate activities such as bird watching should consider and monitor the duration and proximity of the encounters. Some birds will tolerate the presence of people, but there is a distance beyond which closer interactions will cause disturbance or disruption, and may lower reproductive success, decrease foraging efficiency, or force birds to abandon suitable habitats (Burger et al. 1995). Each situation requires observation, continued monitoring and mitigation by refuge staff to avoid undue stress and long-term impacts. In many refuges, paths or boardwalks are used to direct the flow of birdwatchers or others observing wildlife. In others, some of the habitats may need to be closed during a sensitive part of the year (e.g., beach closure for piping plovers or closed areas around bald eagle nests), with sensitive areas fenced to prevent human access. Negative impacts of wildlife observation and photography activities and other ecotourism can be curtailed with careful management and consideration of the needs of both the wildlife and the visitors (Burger et al. 1995).

Long-term impacts from wildlife observation and photography could also have impacts on mammals present on the refuge. With respect to mammalian carnivores, Baker and Leberg (2018) found that coyotes and bobcats had higher occupancy in protected areas with more human disturbance (i.e., trails) but overall, protected areas with less human disturbance had greater carnivore community diversity. Their results varied among species, however, the general trend showed that human activity can have long-term impacts on carnivores. Reed and Merenlender (2008) found that human activity decreased carnivore density and shifted community composition significantly from native species to non-native species.

Though there is little research available for the impacts of recreation on reptiles and amphibians, humans can unknowingly spread diseases and chemicals that are toxic to herpetofauna via hiking shoes, camera equipment, and other field gear. Diseases such as Chytridiomycosis, Ranavirus, and Upper Respiratory Tract Disease are examples of

highly contagious diseases that contribute to high rates of mortality in reptiles or amphibians (National Park Service 2010).

In addition to direct long-term wildlife impacts, wildlife observation and photography can also have long-term indirect impacts by altering wildlife habitats. Habitat fragmentation caused by physical barriers necessary to facilitate wildlife observation and photography, such as roads or trails, may reduce potential habitat for dispersal, as well as decrease the availability of water and food, and ultimately reduce biodiversity (Haddad et al. 2015). Fragmentation may ultimately lead to smaller population sizes within each fragment, and increased vulnerability to population decline and extinction (Fahrig and Merriam 1994). Reducing the survival of vegetation could have cascading impacts for herbivores and possibly higher trophic levels (Haddad et al. 2015).

Visitors can unintentionally introduce invasive plants, animals, and pathogens to habitats (Anderson et al. 2015, Brock and Green 2003, Davies and Sheley 2007, Marion et al. 2006). Once present, invasive species can outcompete native plants and animals, thereby altering habitats (Anderson et al. 2015, Marion et al. 2006). Invasive species can alter native animal and plant species composition, diversity, and abundance (Davies and Sheley 2007, Eischer et al. 2005). These changes may reduce native forage, cover, and water sources (Brock and Green 2003, Eischer et al. 2005). Certain invasive species may even impede access to wildlife observation and photography sites such as hydrilla blocking waterways.

The Northern long-eared bat (NLEB) (*Myotis septentrionalis*) is federally listed as an endangered species under the Endangered Species Act. The bats typically spend winter hibernating in caves and mines, called hibernacula. These bats “use areas in various sized caves or mines with constant temperatures, high humidity, and no air currents” (U.S. Fish and Wildlife Service 2024). During the summer, NLEBs roost “singly or in colonies underneath bark, in cavities or in crevices of both live trees and snag, or dead trees” (U.S. Fish and Wildlife Service 2024). These bats “seem to be flexible in selecting roosts, choosing roost trees based on suitability to retain bark or provide cavities or crevices” (U.S. Fish and Wildlife Service 2024). They rarely roost in human structures like barns and sheds (U.S. Fish and Wildlife Service 2024).

The bat’s range includes much of the eastern and north-central United States, and all Canadian provinces from the Atlantic Ocean west to the southern Yukon Territory and eastern British Columbia. The species’ range includes 37 states and the District of Columbia. Acoustic surveys on Back Bay from 2017 through 2019 detected presence of NLEB the species however none have been confirmed in hand through mist-netting (J. De La Cruz and W. Ford 2020). We have evidence the species breeds in our area. NLEBs are not likely to be impacted by wildlife observation and photography activities. Other than temporary impacts from potential presence disturbance, permit stipulations would ensure no long-term adverse impacts would occur.

## Public Review and Comment

The draft compatibility determination will be available for public review and comment for 14 days. The public will be made aware of this comment opportunity through posting at refuge headquarters, posting on refuge website, social media. State and Tribes have been asked to review and comment on the draft compatibility determination. A hard copy of this document will be posted at the Refuge Headquarters at 1324 Sandbridge Rd, Virginia Beach, VA 23456 and Visitor Center located at 4005 Sandpiper Rd, Virginia Beach, VA 23456. It will be made available electronically on the refuge website <https://www.fws.gov/backbay/>. Please contact the Refuge Manager if you need the documents made available in an alternative format. Concerns expressed during the public comment period will be addressed in the final document.

## Determination

Is the use compatible?

Yes

### Stipulations Necessary to Ensure Compatibility

1. If monitoring or observations indicate an adverse impact from Wildlife Observation and Photography activities on wildlife or their habitat, the refuge manager will take appropriate action to modify or discontinue the use in some or all areas of the refuge.
2. At the refuge manager's discretion, some areas of the refuge will be closed to this use during nesting or migration seasons, or other times of particular sensitivity to minimize human disturbance of shorebirds or other sensitive species and habitats. If necessary, refuge staff will install symbolic fencing or other barriers, as appropriate, to restrict access and maintain a spatial buffer in these areas to minimize disturbance. The number of beach access points may also be reduced.

## 3. Justification

The stipulations outlined above would help ensure that the use is compatible at Back Bay NWR. Wildlife Observation and Photography, as outlined in this compatibility determination, would not conflict with the national policy to maintain the biological diversity, integrity, and environmental health of the refuge. Based on available science and best professional judgement, the U.S. Fish and Wildlife Service has determined that the Wildlife Observation and Photography at Back Bay NWR, in accordance with the stipulations provided here, would not materially interfere with or detract from the fulfillment of the National Wildlife Refuge System mission or the purpose of the

Back Bay NWR. Rather, appropriate and compatible Wildlife Observation and Photography would be the use of the Back Bay NWR through which the public can develop an appreciation for fish, wildlife, and wild lands. These priority public uses identified by Executive Order 12996 (March 25, 1996) and legislatively mandated by the Refuge System Administration Act of 1966 (16 U.S.C. sections 668dd-668ee), as amended by the Refuge System Improvement Act of 1997 (Public Law 105-57), have been found appropriate and compatible, and will provide opportunities through which the American public can develop an appreciation for fish and wildlife and contribute to achieving the mission of the Refuge System.

## Signature of Determination

Refuge Manager Signature and Date

## Signature of Concurrence

Assistant Regional Director Signature and Date

## Mandatory Reevaluation Date

2035

## Literature Cited/References

Anderson, L. G., S. Roccliffe, N. R. Haddaway, and A.M. Dunn. 2015. The role of tourism and recreation in the spread of non-native species: a systematic review and meta-analysis. *PloS one*, 10(10), p.e0140833.

Atlantic Flyway Shorebird Initiative (AFSI). 2015. Atlantic Flyway Shorebird Initiative Business Plan. [www.atlanticflywayshorebirds.org](http://www.atlanticflywayshorebirds.org).

Ardoin, N. M. 2006. Toward an Interdisciplinary Understanding of Place: Lessons for Environmental Education. *Canadian Journal of Environmental Education*. 11(1), 112-126.

Baker, A. D., and P.L. Leberg. 2018. Impacts of human recreation on carnivores in protected areas. *PloS one*, 13(4) 13(4): e0195436.

Barros, A. and C.M. Pickering. 2017. How Networks of Informal Trails Cause Landscape Level Damage to Vegetation. *Environmental Management* 60, 57-68.

Boyle, S.A. and F.B. Samson. 1985. Effects of non-consumptive recreation on wildlife: a review. *Wildl. Soc. Bull.* 13:110-116  
[https://www.jstor.org/stable/3781422?seq=1#metadata\\_info\\_tab\\_contents](https://www.jstor.org/stable/3781422?seq=1#metadata_info_tab_contents)

Brock, J. H., and D. M. Green. 2003. Impacts of livestock grazing, mining, recreation, roads, and other land uses on watershed resources. *Journal of the Arizona-Nevada Academy of Science*, 35(1), 11-22.

Burger, J. 1986. The effect of human activity on shorebirds in two coastal bays in northeastern United States. *Biological Conservation*, 13, 123-130.

Burger, J., and M. Gochfeld. 1991. Human Activity Influence and Diurnal and Nocturnal Foraging of Sanderlings (*Calidris alba*). *The Condor*, 93(2), 259-265.  
<https://doi.org/10.2307/1368941>

Burger, J. and Gochfeld, M. 1998. Effects of ecotourists on bird behavior at Loxahatchee National Wildlife Refuge, FL. *Environmental Conservation*, 25, 13-21.

Burger, J., M. Gochfeld, and L.J. Niles. 1995. Ecotourism and Birds in Coastal New Jersey: Contrasting Responses of Birds, Tourists, and Managers. *Environmental Conservation*, 22(1), 56-65.

Burger, J., C. Jeitner, K. Clark, and L. J. Niles. 2004. The effect of human activities on migrant shorebirds: successful adaptive management. *Environmental Conservation*, 31(4), 283-288. <https://doi.org/10.1017/S0376892904001626>

Burger, J., and L. Niles. 2014. Effects on Five Species of Shorebirds of Experimental Closure of a Beach in New Jersey: Implications for Severe Storms and Sea-Level Rise. *Journal of Toxicology and Environmental Health, Part A*, 77, 1102-1113.  
<https://doi.org/10.1080/15287394.2014.914004>

Carney, Karen M., and William J. Sydeman. "A Review of Human Disturbance Effects on Nesting Colonial Waterbirds." *Waterbirds: The International Journal of Waterbird Biology*, vol. 22, no. 1, 1999, pp. 68-79. *JSTOR*, <https://doi.org/10.2307/1521995>. Accessed 12 July 2024.

Cole, David N.; Landres, Peter B. 1995. Indirect effects of recreation on wildlife. In: Knight, Richard L.; Gutzwiller, Kevin J., eds. *Wildlife and recreationists: coexistence through management and research*. Washington, D.C.: Island Press: Chapter 11, 183-202

Colwell, M. A. 2010. *Shorebird Ecology, Conservation, and Management*. University of California Press, Berkeley, CA.

Cooke, M. T. and L. Xia. 2020. Impacts of land-based recreation on water quality. *Natural Areas Journal*, 40(2), 179-188.

Davies, K. W. and R. L. Sheley. 2007. A conceptual framework for preventing the spatial dispersal of invasive plants. *Weed Science*, 55(2), 178-184.

- Dodd, C. Kenneth, Jr. 1988. Synopsis of the biological data on the Loggerhead Sea Turtle *Caretta caretta* (Linnaeus 1758). U.S. Fish Wildl. Serv., Biol. Rep. 88(14). 110 pp.
- Eiswerth, M. E., T. D. Darden, W. S. Johnson, J. Agapoff, and T. R. Harris. 2005. Input-output modeling, outdoor recreation, and the economic impacts of weeds. *Weed Science*, 53(1), 130-137.
- Fahrig, L. and G. Merriam. 1994. Conservation of fragmented populations. *Conservation Biology*, 8, 50-59.
- Galbraith, H., R. Jones, R. Park, J. Clough, S. Herrod-Julius, B. Harrington, and G. Page. 2002. Global climate change and sea level rise: Potential losses of intertidal habitat for shorebirds. *Waterbirds*, 25(2), 173-183.
- George, S. L., & Crooks, K. R. (2006). Recreation and large mammal activity in an urban nature reserve. *Biological Conservation*, 133(1), 107-117.
- Gill, J.A., K. Norris, and W. J. Sutherland. 2001. Why behavioural responses may not reflect the population consequences of human disturbance. *Biological Conservation*, 97(2), 265-268.
- Gibson, D., M. K. Chaplin, K. L. Hunt, M. J. Friedrich, C. E. Weithman, L. M. Addison, V. Cavalieri, S. Coleman, F. J. Cuthbert, J. D. Fraser, W. Golder, D. Hoffman, S. M. Karpany, A. Van Zoeren, and D. H. Catlin. 2018. Impacts of anthropogenic disturbance on body condition, survival, and site fidelity of nonbreeding Piping Plovers. *The Condor*, 120(3), 566-580. <https://doi.org/10.1650/CONDOR-17-148.1>
- Gutzwiller, K. J., R.T. Wiedenmann, K. L. Clements, and S. H. Anderson. 1994. Effects of Human Intrusion on Song Occurrence and Singing Consistency in Subalpine Birds. *The Auk*, 111(1), 28-37.
- Haddad, N. M., L. A. Brudvig, J. Clobert, K. F. Davies, A. Gonzalez, R. D. Holt, T. E. Lovejoy, J. O. Sexton, M. P. Austin, C. D. Collins, W. M. Cook, E. I. Damschen, R. M. Ewers, B. L. Foster, C. N. Jenkins, A. J. King, W. F. Laurance, D. J. Levey, C. R. Margules, B. A. Melbourne, A. O. Nicholls, J. L. Orrock, D. Song, and J. R. Townshend. 2015. Habitat fragmentation and its lasting impact on Earth's ecosystems. *Science Advances*, 1(2), e1500052.
- Hammitt, W. E., and D. N. Cole. 1998. Wildland recreation: Ecology and Management. 2nd ed. New York: John Wiley and Sons.
- Kerlinger, Paul, Joanna Burger, H. Ken Cordell, Daniel J. Decker, David N. Cole, Peter Landres, E. Norbert Smith et al. *Wildlife and recreationists: coexistence through management and research*. Island Press, 2013.



- Klein, M. L. 1993. Waterbird Behavioral Responses to Human Disturbances. *Wildlife Society Bulletin*. 21(1), 31–39
- Klein, M.L., Humphrey, S.R., and Percival, H.F. 1995. Effects of ecotourism on distribution of waterbirds in a wildlife refuge, *Conservation Biology*, 9, 1454–1465.
- Kudryavtsev, A., R. C. Stedman, and M. E. Krasny. 2012. Sense of place in environmental education. *Environmental Education Research*, 18(2), 229–250.
- Lafferty, K. D., D. Goodman, and C. P. Sandoval. 2006. Restoration of breeding by Snowy Plovers following protection from disturbance. *Biodiversity and Conservation*, 15(7), 2217–2230. <https://doi.org/10.1007/s10531-004-7180-5>
- Leblond, M., C. Dussault, J-P. Ouellet. 2013. Impacts of human disturbance on large prey species: do behavioral reactions translate to fitness consequences? *Plos One*, 8(9): e73695 doi: 10.1371/journal.pone.0073695.
- Linscott, J. A., and N. R. Senner. 2021. Beyond refueling: Investigating the diversity of functions of migratory stopover events. *Ornithological Applications*, 123(1), 1–14. <https://doi.org/10.1093/ornithapp/duaa074>
- Lovegrove, B. G. (2005). Seasonal thermoregulatory responses in mammals. *Journal of Comparative Physiology B*, 175, 231–247.
- MacLean, K., T. S. Prystay, M. J. Lawrence, A. J. Zolderdo, L. F. G. Gutowsky, E. Staaterman, A. J. Gallagher, S. J. Cooke. 2020. Going the distance: influence of distance between boat noise and nest site on the behavior of paternal smallmouth bass. *Water Air Soil Pollution*, 231, 151–163.
- Manning, R. E. and Valliere, W. A. 2001. Coping in outdoor recreation: Causes and consequences of crowding and conflict among community residents. *Journal of Leisure Research*, 33(4), 410–426.
- Marcouiller, D. W. 2008. Outdoor Recreation Planning: A comprehensive approach to understanding use interaction. CAB Reviews: Perspectives in Agriculture, Veterinary Science, Nutrition and Natural Resources, 3(090).
- Marion, J. L. 2019. Impacts to wildlife: managing visitors and resources to protect wildlife. Prepared for the Interagency Visitor Use Council, Edition One, 1–19.
- Marion, J. L., Y. F. Leung, and S. K. Nepal. 2006. Monitoring trail conditions: new methodological considerations. *The George Wright Forum*, 23(2), 36–49.
- Maxwell, R.J., A.J. Zolderdo, R. de Bruijn, J.W. Brownscombe, E. Staaterman, A.J. Gallagher, and S.J. Cooke. 2018. Does motor noise from recreational boats alter

parental care behaviour of a nesting freshwater fish? *Aquatic Conservation: Marine Freshwater Ecosystems*, 28, 969–978.

Melvin, S. M., A. Hecht, and C. R. Griffin. 1994. Piping Plover Mortalities Caused by Off-Road Vehicles on Atlantic Coast Beaches. *Wildlife Society Bulletin (1973-2006)*, 22(3), 409–414.

Mengak, L., and A. A. Dayer. 2020. Defining human disturbance to shorebirds using manager and scientist input. *Environmental Management*, 65(1), 62–73.  
<https://doi.org/10.1007/s00267-019-01230-2>

Mickle, M. F., C.M. Harris, O.P. Love, and D.M. Higgs. 2018. Behavioural and morphological changes in fish exposed to ecologically relevant boat noises. *Canadian Journal of Fisheries and Aquatic Sciences*, 76, 1845–1853.

Miller, S. G., R. L. Knight, and C. K. Miller. 2001. Wildlife Responses to Pedestrians and Dogs. *Wildlife Society Bulletin (1973-2006)*, 29(1), 124–132.

Miller, S. G., R. L. Knight, and C. K. Miller. 1998. Influence of Recreational Trails on Breeding Bird Communities. *Ecological Applications*, 8(1), 162–169.

Morton, J.M., Fowler, A.C., and Kirkpatrick, R.L. 1989. Time and Energy budgets of American black ducks in winter. *Journal of Wildlife Management*, 53, 401–410.  
[https://www.jstor.org/stable/3801143?seq=10#metadata\\_info\\_tab\\_contents](https://www.jstor.org/stable/3801143?seq=10#metadata_info_tab_contents)

Navedo, J. G., C. Verdugo, I. A. Rodríguez-Jorquera, J. M. Abad-Gómez, C. G. Suazo, L. E. Castañeda, V. Araya, J. Ruiz, and J. S. Gutiérrez. 2019. Assessing the effects of human activities on the foraging opportunities of migratory shorebirds in Austral high-latitude bays. *PLOS ONE*, 14(3), e0212441.  
<https://doi.org/10.1371/journal.pone.0212441>

National Oceanic and Atmospheric Administration (NOAA). 2013. *National Coastal Population Report: Population Trends from 1970 to 2020*. NOAA State of the Coast Report Series. <http://stateofthecoast.noaa.gov>

National Park Service [NPS]. 2010. Reptiles and Amphibians – Threats and Concerns. <https://www.nps.gov/articles/reptiles-and-amphibians-threats.htm>

North American Bird Conservation Initiative (NABCI). 2022. *State of the Birds, United States of America, 2022*. <http://www.stateofthebirds.org>.

Perona, A. M., Urios, V. & López-López, P. Holidays? Not for all. Eagles have larger home ranges on holidays as a consequence of human disturbance. *Biol. Conserv.* **231**, 59–66 (2019).

Pfister, C., B. A. Harrington, and M. Lavine. 1992. The impact of human disturbance on shorebirds at a migration staging area. *Biological Conservation*, 60(2), 115–126.  
[https://doi.org/10.1016/0006-3207\(92\)91162-L](https://doi.org/10.1016/0006-3207(92)91162-L)

Reed, S. E. and A. M. Merenlender. 2008. Quiet, nonconsumptive recreation reduces protected area effectiveness. *Conservation Letters*, 1(3), 146–154.

Rogers, D. I., T. Piersma, and C. J. Hassell. 2006. Roost availability may constrain shorebird distribution: Exploring the energetic costs of roosting and disturbance around a tropical bay. *Biological Conservation*, 133(2), 225–235.  
<https://doi.org/10.1016/j.biocon.2006.06.007>

Rosenberg, K. V., A. M. Dokter, P. J. Blancher, J. R. Sauer, A. C. Smith, P. A. Smith, J. C. Stanton, A. Panjabi, L. Helft, M. Parr, and P. P. Marra. 2019. Decline of the North American avifauna. *Science*, 366(6461), 120–124.  
<https://doi.org/10.1126/science.aaw1313>

Ruhlen, T. D., S. Abbott, L. E. Stenzel, and G. W. Page. 2003. Evidence that human disturbance reduces Snowy Plover chick survival. *Journal of Field Ornithology*, 74(3), 300–304. <https://doi.org/10.1648/0273-8570-74.3.300>

Sabine, J. B., J. M. Meyers, C. T. Moore, and S. H. Schweitzer. 2008. Effects of human activity on behavior of breeding American Oystercatchers, Cumberland Island National Seashore, Georgia, USA. *Waterbirds*, 31(1), 70–82.  
[https://doi.org/10.1675/1524-4695\(2008\)31\[70:EOHAOB\]2.0.CO;2](https://doi.org/10.1675/1524-4695(2008)31[70:EOHAOB]2.0.CO;2)

Schulte, S., and T. R. Simons. 2015. Factors affecting the reproductive success of American Oystercatchers *Haematopus palliatus* on the Outer Banks of North Carolina. *Marine Ornithology*, 43, 37–47.

Smith, P. A., A. C. Smith, B. Andres, C. M. Francis, B. Harrington, C. Friis, R. I. G. Morrison, J. Paquet, B. Winn, and S. Brown. 2023. Accelerating declines of North America's shorebirds signal the need for urgent conservation action. *Ornithological Applications*, 125(2), 1–14. <https://doi.org/10.1093/ornithapp/duad003>

Trails and Wildlife Task Force, Colorado State Parks, and Hellmund Associates. (1998). Planning Trails with Wildlife in Mind.  
<https://www.recpro.org/assets/Library/Trails/trails-for-wildlife-handbk.pdf>

U.S. Fish and Wildlife Service. 2024, August 19. Northern long-eared bat. U.S. Fish and Wildlife Service. <https://www.fws.gov/species/northern-long-eared-bat-myotis-septentrionalis>

Virginia Department of Game and Inland Fisheries. 2017. Virginia Sea Turtle Nesting Handbook. Bureau of Wildlife Resources.

Weithman, C., D. Gibson, K. Hunt, M. Friedrich, J. Fraser, S. Karpanty, and D. Catlin. 2017. Senescence and carryover effects of reproductive performance influence

migration, condition, and breeding propensity in a small shorebird. *Ecology and Evolution*, 7(24), 11044–11056. <https://doi.org/10.1002/ece3.3533>

