

# **Draft Compatibility Determination**

## **Title**

Draft Compatibility Determination for Wildlife Observation and Photography, Rachel Carson National Wildlife Refuge.

## **Refuge Use Category**

Wildlife Observation and Photography

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

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

## **Refuge**

Rachel Carson National Wildlife Refuge

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

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

"... suitable for— (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species ..." 16 U.S.C. § 460k-1.

"... the Secretary ... may accept and use ... real ... property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors ..." 16 U.S.C. § 460k-2 (Refuge Recreation Act (16 U.S.C. § 460k-460k-4), as amended).

"... 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).

"... for the development, advancement, management, conservation, and protection of fish and wildlife resources ..." 16 U.S.C. § 742f(a)(4).

"... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude ..." 16 U.S.C. § 742f(b)(1) (Fish and Wildlife Act of 1956).

## **National Wildlife Refuge System Mission**

The mission of the National Wildlife Refuge System, otherwise known as the 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) reviews and replaces the wildlife observation and photography portion of the 2016 CD for Wildlife Observation, Photography, Environmental Education, and Interpretation at Rachel Carson National Wildlife Refuge (NWR, refuge).

What is the use?

The uses being reevaluated under this CD are Wildlife Observation and Photography. These are 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). In addition, these uses are wildlife dependent priority public uses identified in the refuge's Comprehensive Conservation Plan (CCP) (CCP 2007).

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 commercial, 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.

**Wildlife observation (commercial).** Commercial guiding or outfitting of refuge visitors to view fish, wildlife, plants, or their habitats (including provision of access to viewing areas).

Is the use a priority public use?

Yes

Where would the use be conducted?

Wildlife observation and photography would continue to be allowed only on designated refuge trails and observation platforms. At Rachel Carson NWR, 8.2 miles of trails are available and open to visitors (please visit the refuge website for a map of the refuge trails: <https://www.fws.gov/refuge/rachel-carson>).

The **Cutts Island Trail** off Seaport Road in Kittery, ME offers 1.8 miles of easy upland hiking and scenic views of salt marsh. The trail is for foot traffic only. Dogs are not allowed on this trail. There is a restroom at the trailhead and a canoe/kayak launch site is nearby.

The **Furbish Road Overlook** in Wells, Maine is a scenic and easy-to-find place for birding and views of the marsh, forest and wetlands.

The **Harbor Road Trail** in Wells takes you on a 1.0-mile walk through coastal landscapes, with beautiful views of the ocean and marshes. It's perfect for a leisurely stroll and a chance to experience the wildlife and coastal environment up close.

The **Rachel Carson Trail** is a 1.0-mile loop trail near Wells, Maine. It is an accessible trail and takes about 20 minutes to complete. It is very popular for birding, hiking, and dogs are allowed on leash.

The **Sense of Wonder Trail** in Kennebunk is a 0.7-mile loop trail that meanders through forest and past salt marsh with impressive views of the Mousam River. It can be accessed via the parking lot located at 188 Brown Street in Kennebunk. This trail will have an information kiosk, two overlooks, a pollinator garden, and a nature play area.

The **Bridal Path Overlook** on Route 9 in Kennebunk offers a scenic location with views of the Mousam River and surrounding area, making it a perfect spot to pause and take in the beauty of the forest, marsh and landscape.

**Timber Point Trail** is 1.5 miles and has parking on Granite Point Road, Biddeford, ME. This trail offers a scenic walk past a freshwater wetland, coastal shrubland, and provides beautiful salt marsh, river, and ocean views. A universally accessible trail ends at an observation platform overlooking the mouth of the Little River. At the end of the trail, Timber Island is accessible by a land bridge at low tide—be mindful of the tides, as you cannot return during high tide.

**Atlantic Way Trail** (0.9 miles) runs from the end of Atlantic Way (a cul-de-sac off Wildwood Drive) through parts of Rachel Carson National Wildlife Refuge to Seaside Avenue. From the Atlantic Way trailhead, the trail passes through a pleasant mix of young pine and white and gray birch. It's not completely unexpected to come across deer or wild turkeys on this trail.

**Wildwood Trail** in Saco offers a tranquil 0.8 mile walk through the forest, offering peaceful views of the surrounding natural beauty. It's perfect for nature lovers looking to escape into the woods.

**Branch Brook Loop Trail** in Saco provides a 0.5-mile loop through diverse terrain, including wooded areas and wetlands, and is ideal for hikers who enjoy a slightly more challenging trail.

**Goosefare Brook Overlook** in Saco provides views of the mouth of Goosefare Brook and surrounding wetlands, making it an ideal stop for those looking to take in the beauty of the area.

The **Spurwink Fishing Pier** in Scarborough offers a peaceful place to relax and enjoy the views of the water, making it a great spot for fishing and nature observation.

As new trails and overlooks are developed, they will be evaluated and included in this Compatibility Determination on a case-by-case basis. Each new addition will undergo a thorough review to ensure it aligns with the refuge's mission and goals, while also considering environmental impacts, public access, and resource protection. These additions will be integrated into the management framework as they become available, maintaining the balance between public enjoyment and the preservation of trust resources, other wildlife and habitat.

When would the use be conducted?

Public access to the refuge beaches or trails could be limited by seasons, days of the week, or hours of the day to reduce the likelihood of frequent disturbance to nesting or migrating shorebirds or other sensitive species of wildlife. *[be specific when editing the sentence above, such as "all or a portion of the refuge's beach could be closed from April 1 to November 1 each year..."]*

Wildlife observation and photography would be allowed when the refuge is open to the public each day from sunrise to sunset (i.e., daylight hours only), unless otherwise specified. Refuge staff and/or partners may occasionally conduct interpretive programs on topics such as nocturnal wildlife outside of normal refuge operational hours. These programs occur infrequently and require the issuance of a Special Use Permit (SUP) by the Refuge Manager. Access to some trails or areas may be restricted annually from April 1 through November 1 to reduce disturbance to nesting or migrating shorebirds. These dates and restricted areas may be adjusted annually at the discretion of the Refuge Manager to reduce disturbance to sensitive wildlife species.

How would the use be conducted?

Currently, the refuge is open to the public for wildlife observation and photography. Refuge staff allow these priority uses only on designated refuge waters, nature trails, observation platforms and beachfront areas. Trespassing off refuge trails for these

uses is not permitted and is enforced. Refuge dunes and vegetated areas, including the salt marsh, are closed to public entry throughout the year. Walking on the dunes can harm stabilizing vegetation and result in the erosion and loss of important wildlife habitat. “Closed Area” signs mark areas closed to public entry. Refuge staff close parts of the beachfront to public entry by erecting symbolic fencing and posting those areas with “Nesting Area Closed” signs. The closure helps ensure high-quality, undisturbed nesting habitat for piping plovers and other beach nesting migratory birds of management concern (e.g., least terns). Refuge staff prohibit all visitors from walking on and over the dunes, to protect the fragile dune ecosystem.

Existing facilities to support these activities include:

**Cutts Island Trail, Kittery:**

Existing facilities to support activities here include very limited parking, a vault toilet, an information kiosk, kayak launch, and interpretive panels along the trail.

**Furbish Road Overlook, Wells:**

At **Furbish Road**, there is limited parking, an overlook with a bench and an interpretive panel adjacent to the marsh.

**Harbor Road Trail, Wells:**

There is an overlook with an information kiosk, interpretive signs and a viewing platform on **Harbor Road** in Wells, with excellent birding opportunities.

**Rachel Carson Trail, Wells:**

The Rachel Carson Trail is the only pet-friendly trail on the refuge and has several overlooks, an interpretive guide that can be downloaded online, vault toilets, and an information kiosk highlighting the trail.

**Sense of Wonder Trail, Kennebunk:**

The Sense of Wonder Trail is currently being planned at 188 Brown Street in Kennebunk, Maine. When completed, it will have ample parking, a visitor center, information kiosks, two overlooks, a pollinator garden, a nature play area, and eventually a vault toilet and two viewing platforms.

**Bridal Path Overlook, Kennebunk:**

The **Bridal Path Overlook** offers a viewing scope and an interpretive panel overlooking the Mousam River.

**Timber Point Trail, Biddeford:**

At Timber Point Trail, there is excellent birding, a small parking lot, a kayak launch, a pollinator garden, and a viewing overlook with views of the Little River and Timber Island.

**Atlantic Way Trail, Saco:**

The **Atlantic Way Trail** is currently being upgraded to include more parking, signage, and benches.

**Wildwood Trail, Saco:**

The **Wildwood Trail** has limited parking and an informational kiosk. This trail offers a

peaceful walk through the forest and connects to the Branch Brook Loop.

**Branch Brook Loop Trail, Saco:**

The **Branch Brook Loop Trail** also has limited parking and an informational kiosk. Together with the Wildwood Trail, they create a 1.3-mile network. These trails connect two Saco neighborhoods and lead walkers into the Refuge.

**Goosefare Brook Overlook, Saco:**

The **Goosefare Brook Overlook** has limited parking and a viewing platform at the mouth of Goosefare Brook.

**Spurwink Fishing Pier, Scarborough:**

The **Spurwink River Fishing Pier** in Scarborough has limited parking just off Route 77. A carry-in, carry-out, non-motorized boat launch is also located here.

Refuge visitors are only allowed to participate in these activities on designated trails from sunrise to sunset.

Refuge staff do not limit the total number of visitors at the refuge. Recent observations indicate at any one time the total number of visitors does not typically exceed 100 at the refuge. Refuge staff accommodate these priority uses on the refuge and ensure their compatibility in accordance with the stipulations below. Organized groups larger than 25 individuals may be required to obtain a Special Use Permit (SUP) from the Refuge Manager prior to their visit to promote efficient administration of this use and to ensure a quality visit for all visitors.

Commercial tours will be authorized and managed by SUP. Participants in commercial tours would pay a fee to a Service conservation partner, concessionaire, or private business to guide, supervise, and provide them with interpretative, educational, and photographic opportunities on the refuge.

Permits are required for filming or still photography parties of eight or more 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?

We are reevaluating compatibility for these two priority public uses designated by the Refuge System Improvement Act of 1997 that established six wildlife dependent recreational uses appropriate for achieving the mission of the Refuge System. This CD reviews and replaces the wildlife observation and photography portion of the 2016 CD for Wildlife Observation, Photography, Environmental Education, and Interpretation. Refuge staff allow these priority uses only on designated refuge areas in accordance with the goals of the refuge's CCP (USFWS 2007). The refuge provides programming and supporting infrastructure to enhance opportunities for wildlife observation and photography on the refuge.

There is also a new component of wildlife observation and photography being proposed for the refuge, commercial guide led wildlife opportunities through a SUP.

### 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 maintaining roads and trails, maintaining traffic counters and recording related data, analyzing use patterns, monitoring potential impacts of the use on refuge resources and visitors, and providing information to the public about the use are made possible through extensive help of staff, volunteers, and partners. Aside from providing safe and quality priority public uses, road maintenance would be necessary to facilitate refuge management activities by staff. 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.

**Off-setting Revenue:** The commercial use SUP application processing fee is \$60. Annual SUP administration fees currently range from \$100 to \$600 per permit, based on the complexity of the proposed use detailed in the application. The refuge anticipates up to 30 SUPs in the next 15 years. Fees will be re-evaluated annually, and the public would be notified via press release and website updates if changed. Current SUP holders would be notified by email or letter. Commercial SUP fee revenue collected will be returned to the refuge to offset costs of administering the compatible commercial uses of the refuge.

## **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, 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).

Human activities can disrupt bald eagles, hindering their ability to forage, nest, roost, breed, or care for their young. The purpose of these guidelines is to assist individuals in reducing these disruptions, especially in situations where they may lead to "disturbance," which is prohibited under the Eagle Act. These guidelines are recommendations derived from decades of behavioral studies, scientific research, and conservation efforts aimed at preventing or minimizing negative effects on bald eagles (U.S. Fish and Wildlife Service, 2007).

In Maine, bald eagle breeding occurs from February to May, with egg laying and incubation happening during this period. To prevent disturbance to nesting bald eagles, it is recommended to maintain a sufficient distance from the nest (distance buffers), preserve natural or forested areas around the nest trees (landscape buffers), and refrain from specific activities during the breeding season. These buffer zones help reduce the visual and auditory impacts of human activities near nest sites, ideally large enough to protect existing nests and allow for alternative nesting sites. For non-motorized activities such as hiking, camping, fishing, hunting, birdwatching, and kayaking, no buffer is required around bald eagle nests outside of the breeding season. However, during the breeding season, a 330-foot buffer should be maintained if the activity is visible or highly audible from the nest, especially in areas where eagles are not used to such disturbances (U.S. Fish and Wildlife Service, 2007).

## 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, such as Japanese Knotweed, *Reynoutria japonica*, may even impede access to wildlife observation and photography sites by blocking waterways.

## **Public Review and Comment**

The draft CD will be available for public review and comment for 14 days. The public will be made aware of this comment opportunity through posting at the refuge headquarters, posting on the refuge website, and publication of notice in the local newspaper. The State of Maine and the Federally Recognized Tribes in Maine have been asked to review and comment on the draft CD. A hard copy of this document will be posted at the Refuge Headquarters and Visitor Center located at 321 Port Road, Wells, Maine 04090. It will be made available electronically on the refuge website

<https://www.fws.gov/refuge/rachel-carson>. 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 sensitivity to minimize human disturbance of shorebirds or other sensitive species and habitats. 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.

## **Justification**

The stipulation outlined above would help ensure that the use is compatible at Rachel Carson NWR. Wildlife observation and photography, as outlined in this CD, 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 wildlife observation and photography at Rachel Carson NWR, in accordance with the stipulations provided here, would not materially interfere with or detract from the fulfillment of the Refuge System mission or the purpose of the Rachel Carson NWR. Rather, appropriate and compatible wildlife observation and photography would be uses of the Rachel Carson NWR through which the public can develop an appreciation for 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).

Ardoyn, 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.

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>

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. (2007). *National bald eagle management guidelines* (pp. 1–23). [https://www.fws.gov/sites/default/files/documents/national-bald-eagle-management-guidelines\\_0.pdf](https://www.fws.gov/sites/default/files/documents/national-bald-eagle-management-guidelines_0.pdf)

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>