

# Draft Compatibility Determination

## Title

Draft Compatibility Determination for Environmental Education and Interpretation, Oxbow National Wildlife Refuge.

## Refuge Use Category

Environmental Education and Interpretation

## Refuge Use Type(s)

Environmental education (not conducted by NWRS staff or authorized agents), Environmental education (NWRS staff and authorized agents), Environmental education (general), Interpretation (NWRS staff and authorized agents), Interpretation (not conducted by NWRS staff or authorized agents), Interpretation (commercial).

## Refuge

Oxbow National Wildlife Refuge (NWR)

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

... particular value in carrying out the national migratory bird management program. 16 U.S.C. § 667b (An Act Authorizing the Transfer of Certain Real Property for Wildlife, or other purposes)

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

## 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 reviews and replaces the 2004 compatibility

determination for the Environmental Education and Interpretation.

What is the use?

Environmental education includes activities which seek to increase public knowledge and understanding of wildlife and the importance of habitat protection and management. Typical activities include volunteer or staff-guided on-site field trips, off-site programs in communities, and nature study. The refuge also supports education programs in surrounding communities.

Interpretation includes those activities and supporting infrastructure that explain management activities, fish and wildlife resources, ecological processes, and cultural history among other topics to public users. Programs and activities may be developed, sponsored and supervised by the volunteers, partners and/or the Friends of-Woodlands and Waters.

The refuge would continue the activities above plus provide additional volunteer led interpretive and education programs on the refuge. An annual workshop, refuge-specific Environmental Education curriculum, and refuge-sponsored interpretive and educational events on the refuge might also be conducted.

On and off-site environmental education programs and interpretive programs, assistance with workshops, and informational kiosks would be offered at Oxbow NWR. The proposed action also includes interpretive materials on the trails.

**Environmental education (not conducted by NWRS staff or authorized agents).** On-refuge activities not conducted by NWRS staff or authorized agents that use a planned process to foster awareness, knowledge, understanding, and appreciation in students, teachers, or group leaders about fish, wildlife, plants, ecology, natural sciences (such as astronomy) and refuge management.

**Environmental education (NWRS staff and authorized agents).** On-refuge activities conducted by NWRS staff or authorized agents that use a planned process to foster awareness, knowledge, understanding, and appreciation in students about fish, wildlife, plants, ecology, natural sciences (such as astronomy) and refuge management.

**Environmental education (general).** Environmental education activities not specifically defined elsewhere in this category.

**Interpretation (NWRS staff and authorized agents).** On-refuge activities for refuge visitors conducted by NWRS staff or authorized agents that are designed to foster an understanding and appreciation for natural and cultural resources, and associated management.

**Interpretation (not conducted by NWRS staff or authorized agents).** On-refuge activities for refuge visitors not conducted by NWRS staff or authorized agents that are designed to foster an understanding and appreciation for natural and cultural

resources, and associated management.

**Interpretation (commercial).** Commercially guided interpretive tours (including bus or bicycle tours) of the refuge where fees can be collected.

Is the use a priority public use?

Yes

Where would the use be conducted?

Environmental Education and Interpretation programs would occur on established refuge trails, roads and/or the Bill Ashe center. Activities will be held in areas where minimal impact would occur.

Environmental education and Interpretation will be allowed on the approximate 7 miles of trails and approximately 7 miles of Nashua River at Oxbow NWR. These trails include: Esker Loop Trail north of West Main Street, Bill Ashe Trail, Boathouse Trail, Pavilion Trail, and Goddard Trail south of West Main Street and north of Route 2, and Riverside Trail and Turnpike Trail south of Route 2. The canoe/kayak launches along the Nashua River (off Still River Depot Road and Hospital Road) also provide opportunities for environmental education and interpretation. The refuge has few hills, so all trails have very little elevation-gain, offering easy walks without losing any of the nature-experience opportunities. The southern New England floodplain forest, wetland communities, and upland paint a wondrous scene for photographers, wildlife watchers and hikers. The Nashua River connects the northern and southern entrances of the Oxbow National Wildlife Refuge. More detailed information and trail maps can be found at: [fws.gov/refuge/oxbow/visit-us/trails](http://fws.gov/refuge/oxbow/visit-us/trails).

When would the use be conducted?

Environmental Education and Interpretation programs would mostly be conducted during hours when the refuge is open, generally sunrise to sunset. Programs may also occasionally occur at night as they offer unique opportunities to experience nocturnal wildlife. Many species, like owls, bats, and amphibians, are more active at night, allowing participants to observe behaviors that aren't visible during the day. Nighttime programs also provide participants the chance to explore the quiet atmosphere, and engage with sounds, sights, and smells that are distinctive to the evening environment. Night programming will be developed and permitted on a case-by-case basis to minimize impacts to wildlife and habitats.

How would the use be conducted?

Environmental Education and Interpretation programs would occur on foot or in motor vehicle on established trails, or roads. Refuge staff allow these priority uses only on designated refuge water ways, nature trails and partner facilities.

Refuge staff accommodate these priority uses on the refuge and ensure their compatibility in accordance with the stipulations below. Organized groups larger than 10 people are required to contact the Refuge Manager and may need to obtain a Special Use Permit (SUP) prior to their visit to promote efficient administration of this use and to ensure a quality visit for all visitors.

Special use permits will be issued to organizations conducting environmental education or interpretive tours or activities. A fee may be charged for the special use permit. The areas used by such tours will be closely monitored to evaluate the impacts on the resource; if adverse impacts appear, the activity will be moved to secondary locations or curtailed or discontinued. Specific conditions may apply depending upon the requested activity and will be addressed through the special use permit.

Commercial led environmental education is subject to a special use permit and commercial photographers may be charged a fee. The fee is dependent on size, scope and impact of the proposed activity. Periodic evaluations will be done on trails to assess visitor impacts on the habitat. If evidence of unacceptable adverse impacts occurs, these uses will be curtailed, relocated or discontinued. Refuge regulations will be posted and enforced.

Activities will be held in areas where minimal impact will occur. Periodic evaluation of sites and programs will be conducted to assess if objectives are being met and to prevent site degradation. If evidence of unacceptable adverse impacts appear, the location(s) of activities will be rotated with secondary sites, curtailed or discontinued. The known presence of a threatened or endangered species will preclude the use of an area until the Refuge Manager determines otherwise.

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

The National Wildlife Refuge System Improvement Act of 1997 (P.L. 105-57) identifies six legitimate and appropriate uses of wildlife refuges: environmental education, interpretation, hunting, fishing, wildlife observation and wildlife photography. These priority public uses are dependent upon healthy wildlife populations. Where these uses are determined to be compatible, they are to receive enhanced consideration over other uses in planning and management.

Environmental education and interpretation activities generally support Refuge purposes and impacts can largely be minimized. The minor resource impacts attributed to these activities are generally outweighed by the benefits gained by educating present and future generations about refuge resources. Environmental education is a public use management tool used to develop a resource protection ethic within society. While it targets school age children, it is not limited to this group. This tool allows us to educate refuge visitors about endangered and threatened species management, wildlife management and ecological principles and communities. A secondary benefit of environmental education is that it instills an

'ownership' or 'stewardship' ethic in visitors and most likely reduces vandalism, littering and poaching; it also strengthens Service visibility in the local community. Environmental education (outdoor classroom) is listed in the Refuge Manual (U.S. Fish and Wildlife Service, 1985) as the highest priority visitor use activity throughout the National Wildlife Refuge System.

These activities will not materially interfere with or detract from the mission of the National Wildlife Refuge System or the purposes for which the refuge was established.

### **Availability of Resources**

Environmental education and interpretation occur through the use of existing staff, resources, and facilities. Existing resources include staff, interpretive kiosks, displays, and environmental education programs carried out through extensive help of volunteers, displays, and trails. The amount and character of environmental and interpretive programming will be a direct reflection of the refuge's staff and funding levels and/or the Friends of Woodlands and Waters capabilities. The amount of environmental education and interpretive programming provided to the public will be a direct reflection of the refuge's staff and funding levels and/or the Friends of Woodlands and Waters capabilities.

The resources necessary to provide and administer these uses are available within current and anticipated refuge budgets.

Refuge staff would be responsible for the following:

1. Onsite evaluations to resolve public use issues
2. Monitoring and evaluating impacts
3. Maintaining boundaries and signs
4. Meeting with adjacent landowners and interested public
5. Recruiting volunteers
6. Providing environmental education or interpretation programs
7. Development of outreach materials
8. Operation of visitor contact station

### **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 Environmental Education and Interpretation. 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.

Interpretation and environmental education can result in varying impacts to wildlife resources, both positive and negative. These uses represent two of the six priority public uses designated in the National Wildlife 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 National Wildlife 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 interpretation and environmental education activities will be expected to use and 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.

There are many recommendations for reducing impacts to wildlife: provide visitor education, require staying on trails, closing areas during sensitive periods such as nesting, require minimum set back distances for approach to areas such as rookeries, etc. (Boyle et al. 1985, Erwin 1989, Haverra et al. 1992, Klein 1993, Miller et al. 2001, Morton et al. 1989, Rodgers et al. 1995, Taylor and Knight 2003).

### Short-term impacts

Short-term impacts resulting from anthropogenic disturbance from visitors engaging in environmental education and interpretation activities may include changes in wildlife behavior, distribution, or abundance (Leblond et al. 2013). Trails used to facilitate interpretation and environmental education can disturb wildlife outside the immediate trail corridor (Trails and Wildlife Task Force 1998, Miller et al. 2001). Noise caused by visitors engaging in environmental education and interpretation 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 interpretation and environmental education programming has 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 environmental education and interpretation 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.

For tricolored bats, no known maternity roost trees or hibernaculum are located on lands within the Oxbow NWR boundaries. Bats may be disturbed due to the presence of large groups but this is highly unlikely due to their nocturnal behavior.

In addition to direct impacts on wildlife, environmental education and interpretation 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 environmental education and interpretation 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 environmental education and

wildlife interpretation 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 environmental education and interpretation 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).

## Long-term impacts

The long-term effects of Environmental Education and Interpretation activities on species will vary depending on their biology and life history. For example, the same education programming offered during different seasons—for example, during breeding, migration, or wintering for migratory birds—may differ greatly in its impact. Examples include education and interpretation 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 Environmental Education and Interpretation 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 environmental education and interpretation uses include changes at the community and ecosystem scale. Frequent use of areas or trails for environmental education and interpretation 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. Environmental education and interpretation 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 environmental education and interpretation 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 environmental education and interpretation 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.

In addition to direct long-term wildlife impacts, environmental education and interpretation can also have long-term indirect impacts by altering wildlife habitats. Habitat fragmentation caused by physical barriers necessary to facilitate environmental education and interpretation, 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, Eiswerth et al. 2005). These changes may reduce native forage, cover, and water sources (Brock and Green 2003, Eiswerth et al. 2005). Certain invasive species may even impede access to interpretation and environmental education sites such as hydrilla blocking waterways.

## **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 the refuge headquarters. 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 located at 680 Hudson Rd, Sudbury, MA 01776. It will be made available electronically on the refuge website

<https://www.fws.gov/refuge/oxbow>. 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 Environmental Education and Interpretation 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.

## **Justification**

The stipulations outlined above would help ensure that the use is compatible at Oxbow NWR. Environmental Education and Interpretation, 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 Environmental Education and Interpretation at Oxbow NWR, in accordance with the stipulations provided here, would not materially interfere with or detract from the fulfillment of the National Wildlife Refuge System (Refuge System) mission or the purpose of the Oxbow NWR. Rather, appropriate and compatible Environmental Education and Interpretation would be the use of the Oxbow 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**

2040

## **Literature Cited/References**

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