

Huron National Wildlife Refuge Wilderness Character Monitoring Summary

The table and the report that follow are part of a national initiative to establish a baseline wilderness character assessment for all of the National Wildlife Refuges with designated wilderness. The measures for each wilderness were developed with refuge staff and reviewed at the national level. This addendum document complements the 2013 report on wilderness character monitoring for Huron National Wildlife Refuge.



Signatures and dates

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Huron National Wildlife Refuge Wilderness Character Monitoring

Summary Tables

The following tables summarize the original measures selected by refuge staff for wilderness character monitoring in 2013 and reflects any modifications that were made in 2021 to comply with the revised monitoring protocol of *Keeping It Wild 2*. The reasoning for adding, removing, or modifying measures is explained in the narrative sections below the tables. This tables describe each measure, the qualities that it informs, and how often data are collected for the measure. Within this context, a monitoring year will be defined as the fiscal year (October 1 through September 30). As professionals at the refuge have developed these measures with a Wilderness Fellow, it is expected that these measures will form the basis of wilderness character monitoring in the Inventory and Monitoring Plan that is submitted by the refuge to the region.

Wilderness Character Monitoring Measure attributes for Huron Islands Wilderness

Table 1: Untrammelled Quality

Indicator	Measure	Frequency	Data Adequacy	Significant Change	Baseline ¹ Value
Actions authorized by the federal land manager that intentionally manipulate the biophysical environment	Number of person-hours spent maintaining trails (Lighthouse Island only)	1 year	High	1	3 person-hours
Actions authorized by the federal land manager that intentionally manipulate the biophysical environment	Number of research, survey, and monitoring projects that manipulate vegetation, soils, and other factors of the abiotic community	1 year	High	1	0
Actions authorized by the federal land manager that intentionally manipulate the biophysical environment	Number of person-hours spent treating invasive plant species	1 year	High	1	0
Actions not authorized by the federal land manager that intentionally manipulate the biophysical environment	Number of known incidents of unauthorized actions that influence the biotic and abiotic community inside wilderness	1 year	Low	Any	0

¹ The baseline value is defined as the data value entered into the Wilderness Character Monitoring Database from the first year of available data for a particular measure. An individual measure's baseline year may be different from the baseline year of Wilderness Character Monitoring as a whole.

Table 2: Natural Quality

Indicator	Measure	Frequency	Data Adequacy	Significant Change	Baseline² Value
Plants	Percent boreal transition land cover on wilderness islands	10 years	Medium	> 20%	45%
Plants	Number of non-native, invasive plant species	5 years	Low	Any	0
Animals	Presence of white-tailed deer (<i>Odocoileus virginianus</i>) on wilderness islands	1 year	High	Any	0
Animals	Number of non-native, invasive animal species	1 year	Low	Any	0
Air and Water	Ozone air pollution	5 years	Medium	Categorical	68.6 ppb
Air and Water	Total nitrogen wet deposition	5 years	Medium	Categorical	4.6 kg/ha
Air and Water	Total sulfur wet deposition	5 years	Medium	Categorical	2.2 kg/ha
Air and Water	Visibility	5 years	Medium	Categorical	5.0 dV
Ecological Processes	Index of connectivity	5 years	Medium	Any	0.13

² The baseline value is defined as the data value entered into the Wilderness Character Monitoring Database from the first year of available data for a particular measure. An individual measure's baseline year may be different from the baseline year of Wilderness Character Monitoring as a whole.

Table 3: Undeveloped Quality

Indicator	Measure	Frequency	Data Adequacy	Significant Change	Baseline³ Value
Presence of non-recreational structures, installations, and developments	Number of non-recreational structures, installations, and developments	5 years	High	Any	17
Presence of inholdings	Acres of inholdings	5 years	High	Any	0
Use of motor vehicles, motorized equipment, or mechanical transport	Index of administrative mechanical transport, motorized equipment, and motor vehicle use	1 year	Medium	Any	1

³ The baseline value is defined as the data value entered into the Wilderness Character Monitoring Database from the first year of available data for a particular measure. An individual measure's baseline year may be different from the baseline year of Wilderness Character Monitoring as a whole.

Table 4: Solitude or primitive and unconfined recreation

Indicator	Measure	Frequency	Data Adequacy	Significant Change	Baseline ⁴ Value
Remoteness from sights and sounds of human activity <i>inside</i> wilderness	Amount of visitor use	1 year	Low	20%	300 visitors
Remoteness from sights and sounds of human activity <i>inside</i> wilderness	Degree of accumulated trash and debris on Lighthouse Island	1 year	Low	Any	Low
Remoteness from sights and sounds of human activity <i>outside</i> wilderness	Number of people residing in the service area (Marquette, Baraga, Houghton, and Keweenaw counties)	1 year	Medium	5%	115,313 people
Facilities that decrease self-reliant recreation	Miles of agency-provided trails	5 years	High	Any	0.6 miles
Facilities that decrease self-reliant recreation	Number of other agency-provided recreation facilities	5 years	High	Any	2
Management restrictions on visitor behavior	Index of restrictions on visitor behavior	5 years	High	Any	18

⁴ The baseline value is defined as the data value entered into the Wilderness Character Monitoring Database from the first year of available data for a particular measure. An individual measure's baseline year may be different from the baseline year of Wilderness Character Monitoring as a whole.

Table 5: Other Features of Value Quality

Indicator	Measure	Frequency	Data Adequacy	Significant Change	Baseline⁵ Value
Deterioration or loss of integral historical or cultural features	Status of cultural resources (Lighthouse Island only)	1 year	Medium	Any	27

The following people participated in the drafting and approval of the measures in the summary table above:

- Dr. Greg Corace – Biologist/Forester
- Sara Siekierski – Refuge Manger
- Greg McClellan – Deputy Refuge Manager

The following person will be the data steward at the refuge:

- Sara Siekierski – Refuge Manger

⁵ The baseline value is defined as the data value entered into the Wilderness Character Monitoring Database from the first year of available data for a particular measure. An individual measure's baseline year may be different from the baseline year of Wilderness Character Monitoring as a whole.

Narrative

Between March 11th and March 16, 2015, Wilderness Fellow Morgan Gantz had multiple phone conversations with Dr. Greg Corace to discuss the recent changes in the monitoring framework of *Keeping It Wild 2*. Wilderness Fellow Marissa Edwards then worked with Sara Siekierski starting in 2017 and completed this report in 2020. During 2012, Mark Vaniman (Refuge Manager) was the primary staff person at Huron NWR assisting the Wilderness Fellow at that time. From the discussions, one new measure was added, and several measures were removed, modified, or replaced from the original 2013 wilderness character monitoring report to comply with the updated version of *Keeping It Wild*.

Untrammelled Quality

Indicator: Actions authorized by the federal land manager that intentionally manipulate the biophysical environment

Original Measure: [1-1] Number of person-hours spent maintaining trails (Lighthouse Island only); [1-3] Number of person-hours spent treating invasive plant species (Huron Wilderness WCM Report, 2013, p. 7)

Change: MEASURES MODIFIED. The data values for these measures are reported as decimals. Also, for both measures the significant change would be one whole integer in either direction, instead of “Any”, where any decimal value change was considered significant.

Indicator: Actions not authorized by the federal land manager that intentionally manipulate the biophysical environment

Original Measure: [1-4] Number of known incidents of unauthorized actions that influence the biotic and abiotic community inside wilderness (Huron Wilderness WCM Report, 2013, p. 8)

Change: MEASURES MODIFIED. The data adequacy was changed from ‘Moderate’ to ‘Low’ due to the very limited presence of staff on the islands.

Natural Quality

Indicator: Plants
Original Measure: [2-1] Percent boreal transition land cover on wilderness islands (Huron Wilderness WCM Report, 2013, p. 9)
Change: MEASURES MODIFIED. The data frequency for this measure was set at 10 years. The data adequacy was changed from 'High' to 'Medium' because the data is obtained from a national data source and is based upon a digital data analysis method. The original 2012 report did not determine a significant change or baseline value for this measure. A new data collection protocol and 2011 baseline value was established for this measure. The detailed measure description is on pages 17-18.

Indicator: Plants
Original Measure: [2-3] Index of the percent of wilderness acres that are occupied by invasive plant species (Huron Wilderness WCM Report, 2013, p. 10)
Change: MEASURES REPLACED. This measure was replaced due to limited presence of staff on the islands to conduct comprehensive plant surveys. A simpler count of the number of known invasive plant species was selected. The detailed measure description is on page 19.
Updated Measure: Number of non-native, invasive plant species

Indicator: Animals
Original Measure: N/A
Change: MEASURES ADDED. This measure was added to track the presence of any invasive animal species other than white tail deer. The detailed measure description is on page 20.
Updated Measure: Number of non-native, invasive animal species

Indicator: Climate Change
Original Measure: [2-8, 2-9, 2-10] Mean summer temperature; Mean winter temperature; Total precipitation (Huron Wilderness WCM Report, 2013, pp. 12-13)
Change: MEASURES REMOVED. These measures were removed from monitoring. Since climate change is no longer a required indicator in the monitoring framework, it was decided that these measures were not appropriate to represent the ecological processes indicator for the Huron Islands Wilderness. Furthermore, the wilderness islands do not have a weather station located on the islands. The original 2013 report established a data collection protocol that utilized nearby weather station data, which would not necessarily represent the conditions present on the islands.

Indicator:	Ecological Processes
Original Measure:	N/A
Change:	MEASURES ADDED. This is a new indicator in the monitoring framework established in Keeping It Wild 2, and the original 2013 report did not have a measure that would represent this indicator, so “Index of connectivity” was selected. The detailed measure description is on pages 21-24.
Updated Measure:	Index of connectivity

Undeveloped Quality

Indicator:	Count of non-recreational structures, installations, and developments
Original Measure:	[3-1] Count of non-recreational structures, installations, and developments (Huron Wilderness WCM Report, 2013, pp. 14-15)
Change:	MEASURES MODIFIED. To be consistent with measure names, “count” was replaced with “number”. Also, the description for this measure previously only accounted for the lighthouse, assistant keeper’s residence, oil shed, privy, fog signal building, barracks, boathouse and dock. The original measure neglected to account for the tram railway, fuel storage tank, water pump system, flagpole, radio tower, numerous short utility poles (collectively counted as one), in-ground concrete vault, refuge boundary signs (collectively counted as one) and a concrete path with stairways and bridges (collectively counted as one). In addition, the USCG installed a solar panel system sometime after wilderness designation. The baseline measure for this value at the time of wilderness designation should be 17. It increased to 18 when the solar panels were installed sometime after 1972, but exact date is unknown. The original and current primary purpose of the dock and path remains to administer the Light Station. However, the path (including 3 concrete stairways, two concrete bridges) as well as the dock (including the wooden walkway ramp) provide recreational opportunities and are used by wilderness visitors regularly. Replacement of the dock in 2012 improved access to the island which likely increased island visitation. The dock was previously also counted as an agency-provided facility in the Solitude or Primitive and Unconfined Recreation Quality but was removed and will now only be counted with other non-recreational structures to avoid duplicate counting.
Updated Measure:	Number of non-recreational structures, installations, and developments

Indicator: Use of motor vehicles, motorized equipment, or mechanical transport

Original Measure: [3-3] Index of administrative mechanical transport, motorized equipment, and motor vehicle use on wilderness islands

Change: MEASURES MODIFIED. Measure name was reworded to remove redundancy.

Updated Measure: Index of administrative mechanical transport, motorized equipment, and motor vehicle use

Solitude or Primitive and Unconfined Recreation Quality

Indicator: Remoteness from sights and sounds of human activity inside the wilderness

Original Measure: [4-1] Amount of visitor use (Huron Wilderness WCM Report, 2013, pp. 17-18)

Change: MEASURES MODIFIED. The original report did not establish a significant change amount. It was decided that a significant change for the amount of visitor use would be a change in 20%. The baseline value was also changed from 75 to 300 to reflect the estimated amount of visitor use reported in the Refuge Annual Performance Planning report and reports from users.

Indicator: Remoteness from sights and sounds of human activity inside the wilderness

Original Measure: N/A

Change: MEASURES ADDED. Previously, there was not a measure to monitor the presence of trash and debris found in wilderness. Refuge staff have noted that the increased presence of trash has become a concern, so a measure was created so that trash and debris can be tracked. The detailed measure description is on pages 25-26.

New Measure: Degree of accumulated trash and debris on wilderness islands

Indicator: Remoteness from sights and sounds of human activity outside the wilderness

Original Measure: [4-2] Number of potential adult wilderness users residing in the service area (Huron Wilderness WCM Report, 2013, p. 18)

Change: MEASURES MODIFIED. The data adequacy was modified from 'High' to 'Medium' due to the fact that this measure is set up to track the number of potential users of the wilderness, which is not necessarily an accurate count of the actual users to the wilderness. Additionally, this value is important for wilderness character because increases in population within the surrounding areas could lead to increased activity just outside of wilderness. The title of the measure is also changed to reflect that all age groups are included in the data value, not just adults. Lastly, consistent US Census data can now be found online by state: <https://www.census.gov/programs-surveys/popest/data/data-sets.html>. This data source will now be used to gather values for this measure. Be aware the link for this data source will likely change with time. The user will need to search for population estimates by county on <https://www.census.gov/en.html>.

New Measure: Degree of accumulated trash and debris on wilderness islands

Indicator: Facilities that decrease self-reliant recreation

Original Measure: [4-4] Number of agency-provided recreational facilities (Huron Wilderness WCM Report, 2013, pp. 18-19)

Change: MEASURES MODIFIED. Previously, the boat dock was counted in this measure, but because it was originally, and is still currently, used as a management structure, it will now only be counted in Undeveloped. Additionally, interpretive signs will be counted individually under this measure. There is the potential for new interpretive signs to be added in the future, and this measure will now accurately track that change. The baseline value remains as 2, since there were two interpretive signs present in wilderness in the baseline year. Lastly, to differentiate this measure with "Miles of agency-provided trails", "other" was added to the measure name.

Updated Measure: Number of other agency-provided recreation facilities

Other Features of Value Quality

Indicator: Deterioration or loss of integral historical or cultural features
Original [5-1] Index of disturbances to cultural resources (Lighthouse Island
Measure: only) (Huron Wilderness WCM Report, 2013, pp. 20-21)
Change: MEASURES MODIFIED. The description for this measure was vague
in the baseline report. A new measure description was created to
better explain what buildings associated with Lighthouse Island are
included in monitoring. Additionally, because refuge staff may
undertake historical preservation actions, this measure has been
modified to track the status of the resources instead of tracking
individual disturbances. This new measure protocol will take into
account positive actions that preserve the value of these resources.
The detailed measure description is on pages 27-30.
Updated Status of cultural resources (Lighthouse Island only)
Measure:

Indicator: Deterioration or loss of integral geological or paleontological features
Original [5-2] Number of unauthorized removals of paleontological or
Measure: geological resources (Huron Wilderness WCM Report, 2013, p. 21)
Change: MEASURES REMOVED. Since this quality was updated to an optional
quality in *Keeping It Wild 2*, it was decided that this measure would
be removed from monitoring. This measure is not a concern for the
Huron Islands Wilderness as there are no known paleontological or
geological resources within the wilderness. It was included in the
original 2013 report to fulfill the required national reporting
guidelines at that time.

NATURAL QUALITY – Plants

Measure 2-1: Percent boreal transition land cover on wilderness islands

2011 Data Value

45%

Year Of Data Collection

2011

Background and Context

Forest species assemblages are highly influenced by drainage characteristics and topography. Fire is also an important disturbance regime in this ecoregion. Mixedwood forests characterize this region and include white spruce (*Picea glauca*), balsam fir (*Abies balsamea*), quaking aspen (*Populus tremuloides*), paper birch (*Betula papyrifera*) and yellow birch (*B. allegheniensis*). Red (*Pinus resinosa*), white (*P. strobus*) and jack pine (*P. banksiana*) occur on drier sites. There are also stands of sugar maple (*Acer saccharum*), eastern hemlock (*Tsuga canadensis*) and beech (*Fagus grandifolia*). Poorly drained areas support tamarack (*Larix laricina*) and eastern white cedar (*Thuja occidentalis*), with black spruce (*Picea mariana*) and black ash (*Fraxinus nigra*).

Climate change and warmer temperatures may restrict the distribution of some forest species, and lead to a reduction in boreal transition forests. While impacts from climate change are outside of management control, it represents a clear threat to an environment that is otherwise relatively free from other human actions.

Measure Description and Collection Protocol

This measure tracks the transition in plant species and communities on Huron Islands. National Land Cover data is used for the analysis of this measure. The National Land Cover Database 2011 (NLCD 2011) is the most recent national land cover product created by the Multi-Resolution Land Characteristics (MRLC) Consortium. NLCD land cover products categorize land into 16-classes based on land use/cover that has been applied consistently across the United States at a spatial resolution of 30 meters. NLCD 2011 is based primarily on a decision-tree classification of circa 2011 Landsat satellite data. To calculate the percent of boreal transition land cover, add the data to ArcMap and clip the raster layer to the wilderness boundary. Open the attribute table for the clipped raster data and divide the total pixel count of Evergreen forest by the total number of pixel values for the entire wilderness (this number should be 680). Since boreal forest is not a

category used by the NLCD, it is assumed that evergreen forest is in fact boreal forest in this wilderness.

Note: A Rapid Ecological Assessment of forest cover of Huron NWR is a priority survey identified in the station Inventory and Monitoring Plan. At present, it remains an uncompleted survey. In the event it is completed in the future, it will provide more accurate information for this measure, and will be used in place of the method described above to collect data values.

A decrease in the percent of boreal transition land over time represents a downward trend for this measure. For the purposes of wilderness character monitoring, an increase will represent an upward trend for this measure.

Data Source

National Land Cover Data, USGS, Department of the Interior. Data obtained from the Natural Resources Conservation Service Geo Spatial Data Gateway website: <http://datagateway.nrcs.usda.gov/GDGOrder.aspx?order=QuickState>

Data Adequacy

Medium – all records have been gathered for this measure but are based on a national dataset, which may not have precise resolution for small, remote areas such.

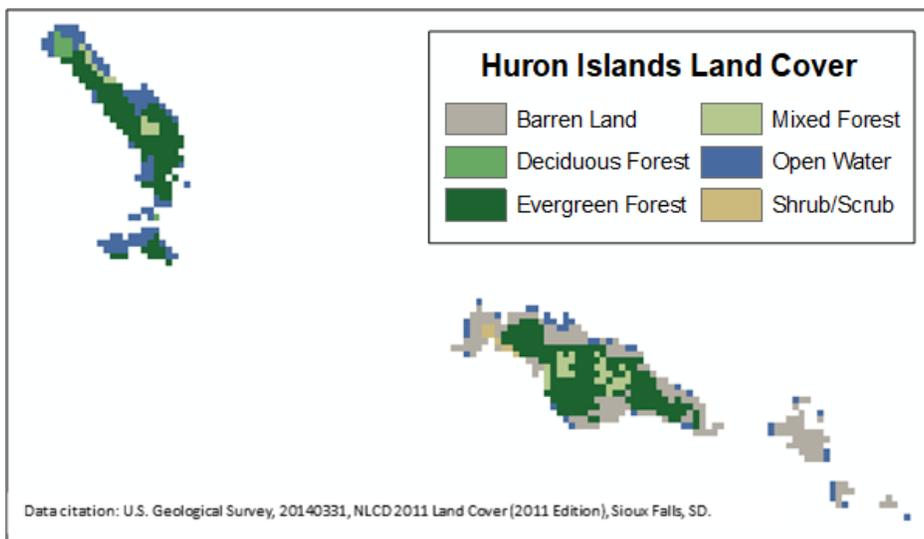
Frequency

Every 10 years

Significant Change

A change of more than 20% is considered significant for this measure.

Image 1: Land cover classifications of Huron Islands



NATURAL QUALITY – Plants

Measure: Number of non-native, invasive plant species

Background and Context

Presence of non-native invasive species represents a degradation of the naturalness of a wilderness. Invasive species cause harm to ecosystems, push native species away, and can have a large-scale effect on an area.

Currently, there are several non-native (exotic) plant species on Lighthouse (West Huron) Island that were purposefully brought to these islands by lighthouse keepers, but do not seem to be adversely impacting the boreal forest. These exotic plants are primarily found near the historical building structures. There are currently no known invasive non-native plant species occupying any of the Huron islands.

Measure Description and Collection Protocol

This measure tracks the number of non-native, invasive plant species in the wilderness. For each invasive species present in wilderness, a value of 1 will be counted toward this measure. Because consistent surveys are not currently performed, this number is based on professional judgement of refuge staff and opportunistic sightings. An increase in the number of invasive plant species over time would represent a downward trend for this measure.

Data Source

Refuge staff, Island Trip Report forms

Data Adequacy

Low – Data is based on opportunistic sightings from refuge staff, who visit a portion of the wilderness about once a year.

Frequency

Every 5 years

Significant Change

Any change is considered significant for this measure.

NATURAL QUALITY – Animals

Measure: Number of non-native, invasive animal species

Background and Context

Presence of non-native invasive species represents a degradation of the naturalness of a wilderness. Invasive species cause harm to ecosystems, push native species away, and can have a large-scale effect on an area.

Though invasive animal species are not expected in wilderness due to the remote nature of the islands, it is possible invasives may be introduced by direct human actions or through climate driven changes. Currently, there are no known invasive animal species present in wilderness.

Measure Description and Collection Protocol

This measure tracks the number of non-native, invasive animal species in the wilderness. For each invasive species present in wilderness, a value of 1 will be counted toward this measure. Because consistent surveys are not currently performed, this number is based on professional judgement of refuge staff and opportunistic sightings. An increase in the number of invasive animal species over time would represent a downward trend for this measure.

Data Source

Refuge staff, Island Trip Report forms

Data Adequacy

Low – Data is based on opportunistic sightings from refuge staff, who visit a portion of the wilderness about once a year.

Frequency

Every 5 year

Significant Change

Any change is considered significant for this measure.

NATURAL QUALITY – Ecological Processes

Measure: Index of Connectivity

2011 Data Value

0.13

Year of Data Collection

2011

Background and Context

As part of their natural functioning, ecological systems remove carbon dioxide from the air, purify surface and ground water, reduce flooding, and maintain biological diversity among other things. These functions depend on a connected ecological framework of high-quality land (EPA). Such land provides for the movement of energy, matter, and species across the landscape. Anthropogenic activities, extensive land development and land ownership all cause fragmentation of the landscape. Over time, protected areas are becoming isolated from the ecological function of their surroundings (Corace et al 2012)⁶. Maintaining ecological connectivity can help to protect the entire system. High connectivity implies high levels of interaction between the movement of animals, plants, heat energy, water, and materials among other elements. The integrity of ecological processes within wilderness is vital to preserving the Natural Quality of wilderness.

The majority of land cover surrounding Huron Islands Wilderness is protected and falls into the categories of forest, open water, shrub, or wetland. A future source of stress to the wilderness ecosystem could be from expanding settlement to the south as a new mine site has just been developed; this measure will allow staff to be aware of the changing land uses that are occurring close to wilderness and offer a tool to analyze how those changes are affecting wilderness character.

Measure Description and Collection Protocol

This measure attempts to track changes in connectivity by monitoring land cover within a 20-mile radius of wilderness. Connectivity is measured by a scoring index that categorizes all adjacent land into simple numerical categories based on the degree of difference from wilderness, multiplied by the percent of the category's land cover within a 20-mile buffer of wilderness. A 20-mile buffer was chosen for

⁶ Corace, R.G. III, L.M. Shartell, L. A. Schulte, W.L. Brininger Jr., M.K.D. McDowell, and D.M. Kashian. 2012. [An ecoregional context for forest management on National Wildlife Refuges of the Upper Midwest, USA](#). *Environmental Management* 49:359-371.

this analysis to provide staff with a useful tool to monitor the larger framework of connectivity surrounding wilderness. The National Land Cover Database 2011 (NLCD 2011) is the most recent national land cover product created by the Multi-Resolution Land Characteristics (MRLC) Consortium. NLCD land cover products categorize land into 16-classes based on land use/cover that has been applied consistently across the United States at a spatial resolution of 30 meters. NLCD 2011 is based primarily on a decision-tree classification of circa 2011 Landsat satellite data. For step-by-step instructions on how to replicate this analysis, follow the instructions listed in the data collection files below. The connectivity spreadsheet contains built in calculations and the 16 classification definitions. For purposes of this monitoring strategy, the categories of open water, deciduous forest, evergreen forest, mixed forest, shrub/scrub, emergent herbaceous wetlands and woody wetlands are lumped into one category when calculating the scoring index because they reflect the same land cover as land within wilderness and do not have any degree of difference. An increase in the index value represents a decrease in connectivity and signifies a downward trend in this measure.

The highest possible score in this index value is 7.0, which would represent 100% high intensity development within a 20-mile buffer of wilderness. The lowest possible score is 0.0, which would represent 100% of the land cover with a similar land use category of wilderness and indicate the highest possible habitat connectivity. Table 1 details the conditions that would be associated with specific scores.

Table 6. Conditions associated with ranges of Index of connectivity scores.

Condition	Good	Caution	Significant Concern
Index of connectivity score:	0 – 1	> 1 and < 3	> 3

Data Source

National Land Cover Data, USGS, Department of the Interior. Data obtained from the Natural Resources Conservation Service Geo Spatial Data Gateway website: <http://datagateway.nrcs.usda.gov/GDGOrder.aspx?order=QuickState>

Data Collection Files

The instructions and data template are housed on ServCat: [How to perform the analysis for the 'Index of connectivity' measure \(83603\)](#)

Data Adequacy

Medium – all records have been gathered for this measure but are based on a national dataset.

Frequency

Every 5 years

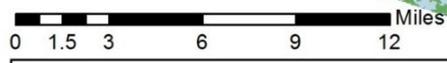
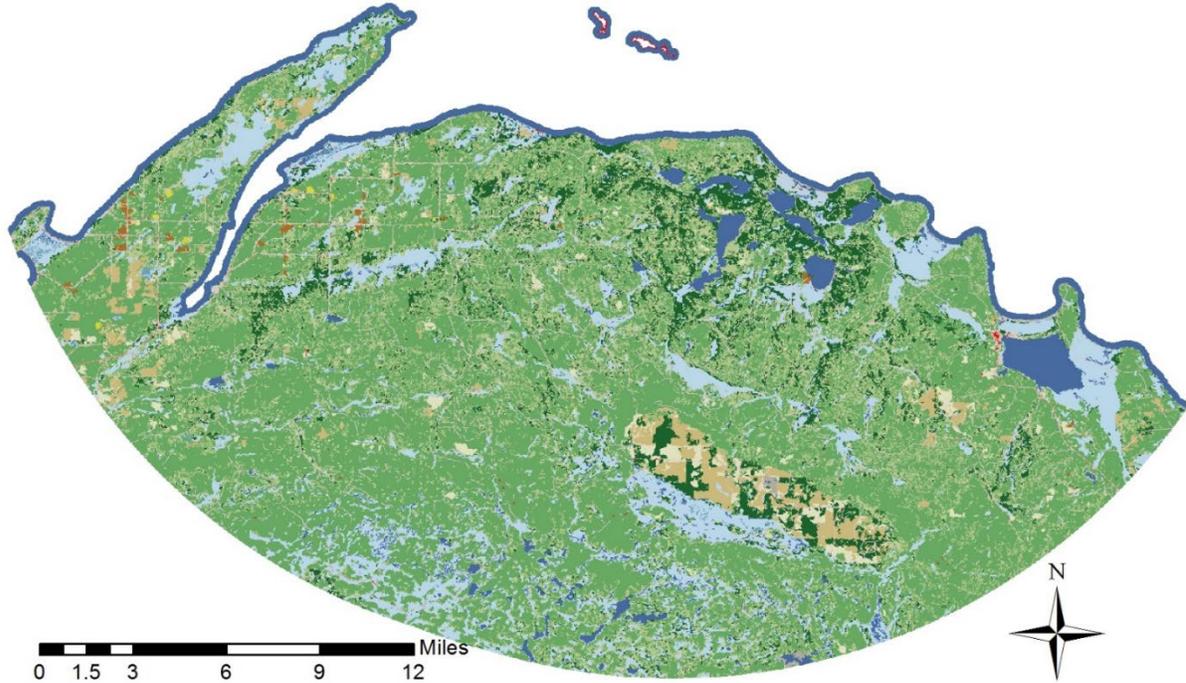
Significant Change

Any change is considered significant for this measure.

Table 7: 2011 Data

Category of Land Use	Degree of Difference from Wilderness	Percent Cover within 20-mile Buffer of Wilderness	Total Category Score
Developed, high intensity	7	0.00%	0.00
Developed, medium intensity	6	0.03%	0.00
Developed, low intensity	5	0.20%	0.01
Developed, open space	4	2.59%	0.10
Barren land	3	0.37%	0.01
Cultivated crops	2	0.20%	0.00
Hay/pasture	1	0.06%	0.00
Open Water, Forest, shrub, or wetlands	0	96.55%	0.00

Total Index score for Huron Islands Wilderness: 0.13



Legend		
Huron Islands Wilderness	Developed, Low Intensity	Herbaceous
Land cover in 20 mile buffer	Developed, Medium Intensity	Mixed Forest
Barren Land	Developed, Open Space	Open Water
Cultivated Crops	Emergent Herbaceous Wetlands	Shrub/Scrub
Deciduous Forest	Evergreen Forest	Woody Wetlands
Developed, High Intensity	Hay/Pasture	

Data citation: U.S. Geological Survey, 20140331, NLCD 2011 Land Cover (2011 Edition), Sioux Falls, SD.

SOLITUDE OR PRIMITIVE AND UNCONFINED RECREATION QUALITY – Remoteness from sights and sounds of human activity *inside* wilderness

Measure: Degree of accumulated trash and debris on Lighthouse Island

Background and Context

Trash and debris in a wilderness impacts a visitor's experience because it is an obvious sign of human presence. This trash may wash up on shore or be left behind by visitors to the wilderness. Human fecal matter has also been observed and may need to be addressed in the future. It should be considered trash/debris for this measure. Lighthouse Island is the only wilderness island open to public visitation, which makes it the most susceptible to trash and debris.

Measure Description and Collection Protocol

This measure determines the degree of debris and litter present on Lighthouse Island.

1. Very Low – Only very small pieces of litter (e.g. bottle caps, cigarette butts, etc.) in very few locations (1-3) would be recorded as very low degree
2. Low – Some evidence of small debris (e.g. beverage cans, bottles, wrappers, etc.) at several locations (more than 3) and/or indications of human fecal matter or toilet paper were present on at least one visit would be recorded as low degree
3. Moderate – A moderate degree would be recorded if some larger pieces of debris (e.g. 13 gallon trash bag) are accumulating along with several to many small pieces of litter and/or one or more observations of human fecal matter were observed on more than one occasion suggesting an infrequent, but reoccurring issue
4. High – A high score would be recorded if many pieces of larger debris and many pieces of small litter have accumulated (e.g. 55 gallon trash bag or multiple 13 gal bags) and/or numerous (more than 3) indications of fecal matter are present during any one visit
5. Very High – A very high score would be recorded if the debris and litter has accumulated to a much higher level than stated above

This information is gathered opportunistically with other refuge work on Lighthouse Island. An increase in the degree of accumulated trash and debris over time would represent a downward trend for this measure.

Data Source

Refuge staff, Island Trip Report forms

Data Adequacy

Low – Data is based on opportunistic sightings from refuge.

Frequency

Annually

Significant Change

Any change from one category to another is considered significant for this measure.

OTHER FEATURES OF VALUE QUALITY – Deterioration or Loss of Integral Historical or Cultural Features

Measure: Status of cultural resources (Lighthouse Island only)

(Modified from Huron Wilderness WCM Report, 2013, pp. 20-21)

Background and Context

Recording the number of disturbances to cultural resources is directly linked to the indicator “Loss of statutorily protected cultural resources”. While cultural resources are often manmade structures, they are irreplaceable relics of significant times in human history. They reflect the primeval character of wilderness and have often been in place for hundreds of years. They are a crucial part of human history and the wilderness’ history as well. It is therefore important to monitor the degradation or disturbance to the value of these resources, which may be caused by authorized, unauthorized, or natural means.

The Huron Island Light Station on Lighthouse Island was in operation from 1868 to 1972 before the light became fully automated in 1972. It encompasses 7 buildings, including the lighthouse. The Huron Islands Lighthouse serves as a strategically important navigational aid for thousands of ships charting the waters of Lake Superior for over 150 years and remains in operation today. It is considered a crucial and prominent part of the Huron Wilderness history. The lighthouse is constructed of locally mined granite rock, while the other buildings (Assistant Keepers Quarters, Privy, Oil House, Fog Signal Building, and Barracks) are less architecturally unique and made of concrete, wood or brick materials. The locations and functions of the other buildings represent the components of the Light Station and the unique challenges of operating and living on a remote and isolated island. Having a sense of the fully operational light station and what life was like at the time is of historical value and a component of this wilderness’ value.

On September 2, 1975 the Huron Islands Lighthouse was entered in the National Register of Historic Places. The other structures that comprise the Huron Island Light Station are eligible for listing on the National Register of Historic Places and subject to the National Historic Preservation Act which requires agencies to take into account the effect of their undertakings (including neglect) on historic properties and weigh the benefits and costs to determine what is in the public interest. The 2019 Huron Light Station MRDG workbook preferred alternative for

managing the historic buildings indicates management should preserve the lighthouse building and further evaluate the remaining infrastructure to determine the minimum necessary to preserve the historic significance of the Light Station while improving wilderness character beyond benchmark conditions where appropriate. Additional analysis will be done for each installation and consultation with the State Historic Preservation Office will ultimately determine which buildings are removed or preserved. Until this process is complete and any mitigation requirements have been met, all buildings must be stabilized or mothballed to protect historic value.

Lighthouse Island is the only island that allows visitors. Although visitor use is relatively light, the lighthouse and many of the other structures on Lighthouse Island have been subject to vandalism. Also, prior to the roof being replaced in 2006, the interior of the lighthouse had been damaged by water and severe weather. Any increase in the amount and severity of disturbances to the cultural resources on Lighthouse Island that result in the loss of historical value would degrade the other features quality.

Measure Description and Collection Protocol

This measure quantifies the status of cultural resources at Lighthouse Island: Huron Islands Lighthouse, Boat House, Fog Signal Building, Oil House, Privy, Assistant Keepers Quarters, Barracks, Pathway, Dock, flagpole, radio tower, Tramway/turntable, and nonhazardous utility infrastructure that will be collectively considered as one component. These 13 resources are classified according to the categories described below in Table 2. Scores for each resource are summed to generate the reported value for this measure. If additional significant cultural resources are documented in the future, they may be added to this measure. An increase in the overall status score for cultural resources over time would represent a downward trend for this measure.

Table 8. Scores associated with each status category for cultural resources.

Status	Score
Good	1
Fair	2
Poor	5
No Longer Eligible (NLE)	10

Good – the following conditions are all met:

1. The object(s), site, or historical information has been primarily affected only by natural forces over time; or, at the least, there is no evidence of modern human disturbance resulting in any loss of information potential.

2. Natural disturbance is acceptable and within the parameters of the National Historic Preservation Act (if applicable)
3. If applicable, any mitigation measures agreed upon in a Memorandum of Agreement in accordance with the National Historic Preservation Act are maintained and available as described in the agreement.

Fair – any one of the following conditions is present:

1. There appears to be minor disturbance by unauthorized modern human activity (e.g., unsuccessful attempts at trespass, visitor-created trails minor degradation from human contact, etc.).
2. Though not apparent to the untrained eye, some material may be missing from undocumented or poorly curated past removals, leading to some loss of information potential.
3. Greater-than-acceptable natural deterioration has occurred.
4. Human-caused deterioration from off-site impacts (e.g., air quality affecting lighthouse exterior, erosion, lake level changes) has occurred.
5. If applicable, any mitigation measures agreed upon in a Memorandum of Agreement in accordance with the National Historic Preservation Act are maintained but are not fully available as described in the agreement.

Poor – any one of the following conditions is present AND management of sites on the National Register has not occurred:

1. There is clear evidence of major disturbance by unauthorized modern human activity (e.g., building trespass, graffiti, arson).
2. The site has clearly lost a significant amount of its information potential.
3. Unacceptable, irreversible natural deterioration has occurred.
4. Unacceptable, irreversible human-caused deterioration from off-site impacts has occurred.
5. If applicable, the mitigation measures agreed upon in a Memorandum of Agreement in accordance with the National Historic Preservation Act fail to be met or are not maintained and available as described in the agreement.
6. NLE – the cultural resource has so deteriorated from human-caused effects that it is deemed no longer eligible for the National Register of Historic places.

Data Source

Refuge staff, Island Trip Report forms

Data Adequacy

Medium – disturbance to buildings on Lighthouse Island are easily monitored by staff, but some of the category criteria above may be subjective.

Frequency

Annually

Significant Change

Any change is considered significant for this measure.

Huron Islands Wilderness Character Monitoring Data Update

As part of this process the most current data relating to wilderness character monitoring at Huron Islands was compiled. The following tables reflect all of the measure values calculated from data collected from the creation of the baseline report in 2013 (the baseline year for Huron Islands Wilderness) until the completion of this update in 2021. The following data should also be entered into the wilderness character monitoring online database annually by the Wilderness Data Steward at the Refuge or the Region.

Updated Wilderness Character Monitoring Measure data for Huron Islands Wilderness

N/A denotes data collection frequency not applicable, so no data value reported

TBD denotes a data value that has not yet been collected/reported

Table 9: Untrammelled

Measure	Freq.	Baseline ⁷	2012	2013	2014	2015	2016	2017	2018	2019	2020	Comments
Number of person-hours spent maintaining trails (Lighthouse Island only)	Annually	N/A	3	0	0	0	4	0	1	5	10	
Number of research, survey, and monitoring projects that manipulate vegetation, soils, and other factors of the abiotic community	Annually	N/A	0	0	0	0	0	0	0	0	0	
Number of person-hours spent treating invasive plant species	Annually	N/A	0	0	0	0	0	0	0	0.5	14	
Number of known incidents of unauthorized actions that influence the biotic and abiotic community inside wilderness	Annually	N/A	0	0	0	3	2	2	2	4	2	2015 – Unauthorized trail work, campfires, graffiti 2016 – Campfires & trash 2017 – minor trash 2018 & 2019 campfires

⁷ This column should be used for any measure that has an individual measure baseline year that is different from the WCM baseline year for the wilderness. If the measure’s baseline year is the same as the WCM baseline year, then represent this with N/A in the Baseline column, and insert the value in the subsequent column.

Table 10: Natural

Measure	Freq.	Baseline ⁸	2012	2013	2014	2015	2016	2017	2018	2019	2020	Comments
Percent boreal transition land cover on wilderness islands	10 years	45% (2011)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	NA	
Number of non-native, invasive plant species	5 years	N/A	0	N/A	N/A	N/A	N/A	0	N/A	N/A	NA	
Presence of white-tailed deer (<i>Odocoileus virginianus</i>) on wilderness islands	Annually	N/A	0	0	0	0	0	0	0	0	0	
Number of non-native, invasive animal species	Annually	0	0	0	0	0	0	0	0	0	0	
Ozone air pollution	5 years	68.6 ppb (2009)	N/A	N/A	65.8 ppb	N/A	N/A	N/A	N/A	TBD	N/A	
Total nitrogen wet deposition	5 years	4.6 kg/ha (2009)	N/A	N/A	3.3 kg/ha	N/A	N/A	N/A	N/A	TBD	N/A	
Total sulfur wet deposition	5 years	2.2 kg/ha (2009)	N/A	N/A	1.4 kg/ha	N/A	N/A	N/A	N/A	TBD	N/A	
Visibility	5 years	5.0 dv (2009)	N/A	N/A	3.4 dv	N/A	N/A	N/A	N/A	TBD	N/A	
Index of connectivity	5 years	0.13 (2011)	N/A	N/A	N/A	N/A	TBD	N/A	N/A	N/A	N/A	

⁸ This column should be used for any measure that has an individual measure baseline year that is different from the WCM baseline year for the wilderness. If the measure's baseline year is the same as the WCM baseline year, then represent this with N/A in the Baseline column, and insert the value in the subsequent column.

Table 11: Undeveloped

Measure	Freq.	Baseline⁹	2012	2013	2014	2015	2016	2017	2018	2019	2020	Comments
Number of non-recreational structures, installations, and developments	5 years	17 (1970)	18	N/A	N/A	N/A	N/A	18	N/A	N/A	N/A	Solar panels added since 1970
Acres of inholdings	5 years	N/A	0	N/A	N/A	N/A	N/A	0	N/A	N/A	N/A	
Index of administrative mechanical transport, motorized equipment, and motor vehicle use	Annually	N/A	1	0	0	2	3	0	2	0	2	

⁹ This column should be used for any measure that has an individual measure baseline year that is different from the WCM baseline year for the wilderness. If the measure's baseline year is the same as the WCM baseline year, then represent this with N/A in the Baseline column, and insert the value in the subsequent column.

Table 12: Solitude or primitive and unconfined recreation

Measure	Freq.	Baseline ¹⁰	2012	2013	2014	2015	2016	2017	2018	2019	2020
Amount of visitor use	Annually	N/A	300	300	300	300	300	300	1131	1403	496
Degree of accumulated trash and debris on Lighthouse Island	Annually	Low (2015)	N/A	N/A	N/A	Low	Low	Low	Low	Low	Moderate –started tracking observations of fecal matter/toilet paper and removed broken glass and nails from island
Number of people residing in the service area (Marquette, Baraga, Houghton, and Keweenaw counties)	Annually	115,313 (2011)	115,459	115,311	115,082	114,409	113,692	113,502	113,168	113,168	112,708
Miles of agency-provided trails	5 years	N/A	0.6	N/A	N/A	N/A	N/A	0.6	N/A	N/A	N/A

¹⁰ This column should be used for any measure that has an individual measure baseline year that is different from the WCM baseline year for the wilderness. If the measure’s baseline year is the same as the WCM baseline year, then represent this with N/A in the Baseline column, and insert the value in the subsequent column.

Measure	Freq.	Baseline ¹⁰	2012	2013	2014	2015	2016	2017	2018	2019	2020	Comments
Number of other agency-provided recreation facilities	5 years	N/A	2	N/A	N/A	N/A	N/A	2	N/A	N/A	N/A	
Index of restrictions on visitor behavior	5 years	N/A	18	N/A	N/A	N/A	N/A	18	N/A	N/A	N/A	

Table 13: Other Features of Value

Measure	Freq.	Baseline ¹¹	2012	2013	2014	2015	2016	2017	2018	2019	2020	Comments
Status of cultural resources (Lighthouse Island only)	Annually	N/A	27	27	27	27	27	27	27	27	27	

¹¹ This column should be used for any measure that has an individual measure baseline year that is different from the WCM baseline year for the wilderness. If the measure's baseline year is the same as the WCM baseline year, then represent this with N/A in the Baseline column, and insert the value in the subsequent column.