

Waukegan Harbor Area of Concern Remedial Action Plan
Proposed Removal Recommendation for the Loss of Fish and Wildlife Habitat
Beneficial Use Impairment (Habitat Loss BUI)
October, 2012

Purpose

The purpose of this document is to summarize restoration activities and provide the rationale for removal of the Loss of Fish and Wildlife Habitat (Habitat Loss) Beneficial Use Impairment (BUI) in the Waukegan Harbor Area of Concern (AOC).

Overview

In 1975, PCB contamination was discovered in the Waukegan Harbor as a result of manufacturing activities at Outboard Marine Corporation (OMC). In 1981, the International Joint Commission (IJC) identified Waukegan Harbor as an AOC and identified six BUIs. In 1990, the Waukegan Harbor Citizens Advisory Group (CAG), formed by the Illinois Environmental Protection Agency (IEPA) to assume a leadership role in the development of Remedial Action Plans (RAP) for the AOC, completed the Stage I RAP in 1993, the Stage II RAP in 1995, and the Stage III RAP in 1999. This final RAP identified restoration goals for each of the five BUIs; however, these restoration goals were established before U.S. EPA published "Restoring United States Areas of Concern: Delisting Principles and Guidelines" in December of 2001. As a result, USEPA and IEPA funded a project to review, revise and update the restoration goals listed in the Stage III RAP using the consultant, Environmental Consulting & Technology, Inc. and a technical team that included the Waukegan Harbor CAG and Illinois EPA. The resulting document is the "Delisting Targets for the Waukegan Harbor Area of Concern: Final Report," completed in October 2008. This report is the current guiding document for RAP and delisting activities for the Waukegan Harbor AOC.

Previously-published RAP documents recognized that the industrial developments of the harbor result in poor habitat for fish and wildlife. Sediment contamination and accumulation were identified as the primary limitations on fish and wildlife habitat. In the Delisting Targets document of 2008, the Habitat Loss BUI assessment stated that

"Use impairments still exist with regard to fish habitat. The Waukegan AOC is 'not impaired' in terms of its ability to support healthy marsh bird and amphibian communities. However, land based invasive plants pose a threat to existing dunal habitat."

At the present time, the Waukegan Harbor AOC is jointly managed by the IEPA, Illinois Department of Natural Resources (IDNR), and the Waukegan CAG.

Geographic Description & AOC Boundary

The Waukegan Harbor AOC is located on the west shore of Lake Michigan in Waukegan, Illinois approximately forty miles north of Chicago. A natural inlet and portions of adjacent wetlands were filled to form the present shape of the harbor. The harbor is surrounded by industrial, commercial, municipal, recreational, open and vacant lands. The AOC is bounded by North Ditch to the north, Elgin, Joliet and Eastern Railway to the west, and the South Harbor Channel Wall to the south.

Following the formation of the Waukegan CAG, the IEPA, CAG and the public met and developed what is known as the Waukegan Expanded Study Area (ESA). The ESA addresses additional known areas of

contamination that may impact nearshore waters of Lake Michigan and the AOC. The ESA extends from the Dead River south to the city of North Chicago, including lands east of Sheridan Road. While sites within the ESA are critical to the health and sustainability of Waukegan Harbor and surrounding communities, this recommendation covers only activities within the original designated AOC. A management plan for the ESA is being developed in conjunction with the AOC management plan.

Beneficial Use Impairments History

The 1987 amendments to the Great Lakes Water Quality Agreement (GLWQA) further defined the BUIs (IJC, 1987). Identified BUIs for the Waukegan Harbor AOC are as follows:

1. Restriction on dredging activities;
2. Degradation of benthos;
3. Degradation of phytoplankton and zooplankton populations;
4. Restrictions on fish and wildlife consumption;
5. Loss of fish and wildlife habitat; and,
6. Beach closings.

The first four BUIs are the results of industrial contamination from the manufacturing activities at OMC where hydraulic fluids containing PCBs were discharged through floor drains at the OMC plant and were released to Waukegan Harbor and North Ditch.

The fifth BUI is a result of the urbanized and industrialized nature of the Waukegan Harbor lakefront and the impact of contaminants on fish and wildlife. The Waukegan Harbor AOC has limited wildlife and fish habitat due to the industrial nature of the man-made harbor, but the habitat that exists is threatened by invasive species.

The sixth BUI, beach closings is primarily the results of high bacteria levels from fecal contamination and gull activity on the two beaches within the confines of the Waukegan Harbor AOC. These issues have been resolved and this BUI was removed in 2011.

Loss of Fish and Wildlife Habitat BUI Restoration Targets

The restoration targets identified by the state, federal, and local principals are described in the “Delisting Targets for the Waukegan Harbor Area of Concern: Final Report” dated October 30, 2008 (ECT, 2008). The specific restoration criteria for delisting of the Loss of Fish and Wildlife Habitat BUI are:

1. A local fish and wildlife habitat management and restoration/rehabilitation plan has been developed for the entire AOC that:
 - a. Defines the causes of all habitat impairments within the AOC;
 - b. Establishes site-specific habitat and population targets for fish and wildlife species within the AOC;
 - c. Identifies all fish and wildlife habitat restoration programs and activities within the AOC and establishes a mechanism to assure coordination among the programs/activities including identification of lead agencies;
 - d. Establishes a timetable, funding mechanisms and lead agency responsibility for all fish and wildlife habitat restoration activities within the AOC.
2. The programs and actions necessary to accomplish the recommendations identified in the fish and wildlife management and restoration plan are implemented, and modified as needed to ensure continual improvement.

Actions

1. Establish appropriate fish and wildlife monitoring programs to determine current baseline conditions and trends in populations as recommended habitat site restoration projects are implemented.

Public Involvement

The Waukegan Citizens Advisory Group is leading many of the current restoration efforts in the AOC and they have been involved throughout the development of the 2012 Habitat Management Plan.

- The CAG received a grant for monitoring, restoration and education in the AOC and they are administering and guiding the implementation with a team of well qualified experts.
- IDNR staff has worked with CAG members to discuss the management plan and gather data from CAG programs and files.
- CAG participated in a site visit with USEPA and IDNR on July 8, 2012.
- CAG principles reviewed the plan and removal recommendation in advance of presentation to general membership.
- The public meetings were held on September 20, 2012, and October 18, 2012
- Habitat Management plan was posted on CAG website with request for comments.
- The CAG endorsed this report and the removal of the BUI for Habitat Loss on xxxdate????

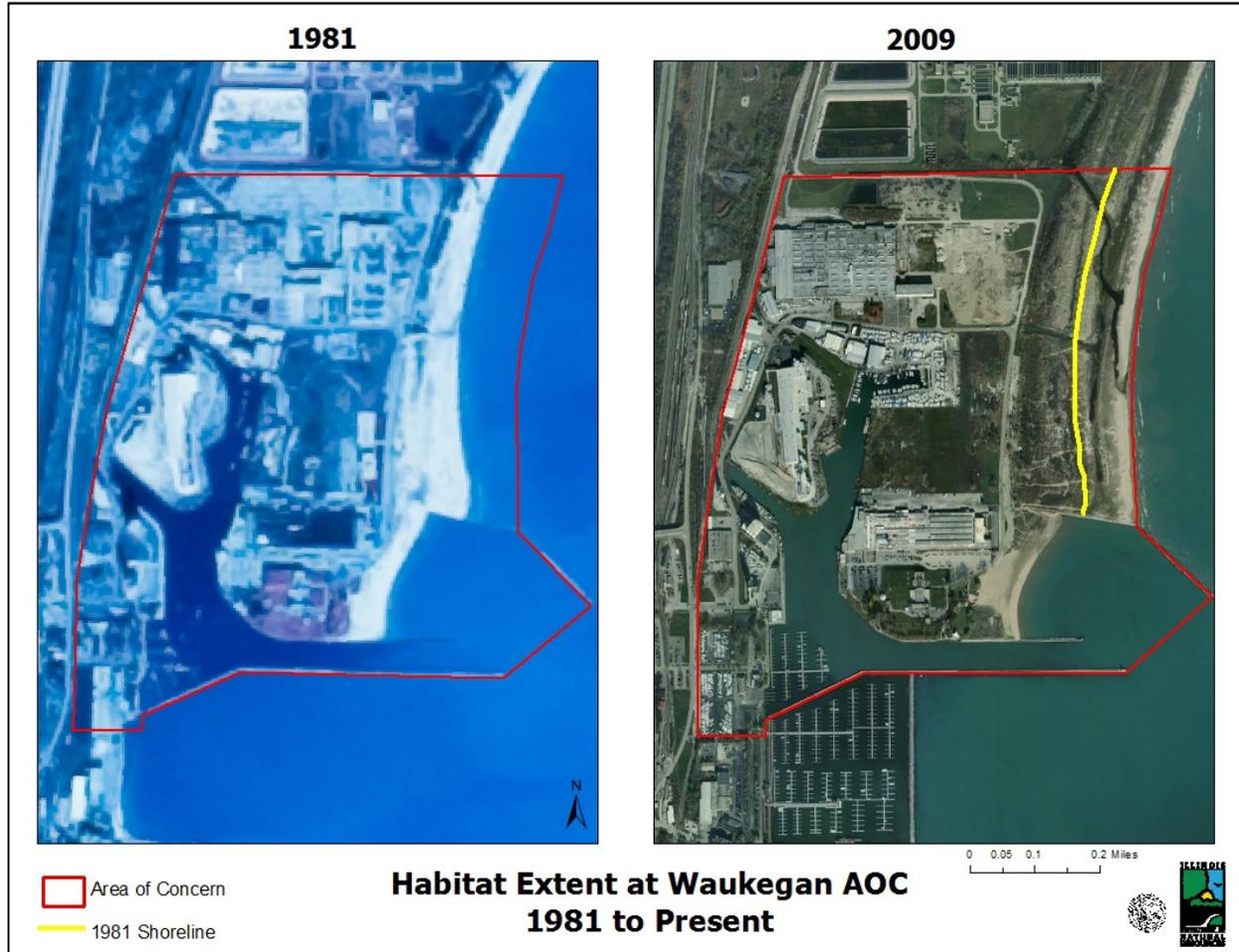
Summary of Remedial Actions Implemented to Address the BUI

Since the area was designated as an AOC, there have been several changes that affect the status of the Habitat Loss BUI. The natural lands east of the harbor have increased approximately 50% in area since 1980, creating new dunal habitats that did not exist at the time of listing (Figure 1). Responsibility for the Waukegan Harbor AOC shifted from IEPA to the IDNR's Coastal Management Program (ICMP) in 2011. The AOC is a priority issue for ICMP and new staff and funding associated with this program are available to focus on the ongoing needs and commitments for the AOC.

A number of remedial actions have been completed to address the Habitat Loss BUI at Waukegan Harbor. The focus of these habitat specific remedial actions has been on impairments of terrestrial (non-harbor) habitat because the fish habitat in the harbor is dependent upon PCB removal, which is being addressed through other BUI remedial actions. A brief summary of soil and sediment remediation is included as it relates to the Habitat Loss BUI.

IDNR, in cooperation with the CAG, USEPA, USFWS and IEPA, completed the Waukegan Harbor Habitat Management Plan (2012) to fulfill the delisting targets and actions as identified in the Delisting Targets document (ECT, 2008). The original impairments to fish and wildlife habitat were addressed in the management plan and additional plans and future actions were identified to address some longer term habitat issues that are not directly related to the originally identified BUI. Additional remedial actions are summarized below.

Figure 1. Amount of increased beach and dune habitat from 1981 to 2009



Soil and Sediment Contamination

Completed work on the Outboard Marine Corporation (OMC) Superfund site has eliminated much of the sediment and soil contamination caused by legacy pollutants. Sediment remediation through a dredging project in 2012 will complete the removal of PCBs from harbor sediments to a level of 0.2 ppm by 2013. This should directly alleviate the dredging BUI, and address the primary impairment of loss of fish habitat in the harbor.

Soil clean up at the Waukegan Manufactured Gas and Coke Plant (WCP) was completed in 2005. Passive clean-up of groundwater contamination will continue until monitoring indicates safe contaminant levels are achieved.

Cleanup of PCBs from North Ditch and surrounding soils was completed in 2012. Sediments were cleaned and removed to a level of 1.0 ppm and a gravel/sand/geotextile cap was placed over the existing stream bed.

Structural Modification

Significant actions to reduce the effects of structural modifications of developed lands on habitat are not within the scope of the management plan. However, the CAG, IDNR, IEPA and USEPA have worked closely with the superfund projects to promote and implement remedial actions that are compatible with the adjacent natural lands. These completed actions included providing expertise and advice on the nature and source of capping material at North Ditch, and providing planting recommendations and seed sources for capped lands. This coordination has been crucial in preventing errors that could pose habitat challenges for years to come. In addition the CAG and other stakeholders have supported and continue to promote green infrastructure practices to improve the quality of adjoining habitat.

Invasive Species

In 2010, the CAG received a GLRI grant for \$1,433,350 to address habitat management, monitoring, and outreach needs in the Waukegan ESA, including the original AOC, as part of the Southern Buffer project. As part of the grant, herbaceous and woody invasive plants will be removed and/or controlled within the dune habitat to improve habitat for native species. The dunal habitats have been mapped in detail to provide the scope and basis for the restoration work. Some invasive species control has started and a contract is in place for targeted control efforts. This project is scheduled to run through 2014, but will likely be extended to account for some early delays.

The following lists the specific activities that are being done as a part of this grant. The overall objective is 95% reduction/removal of target invasive species within the priority areas of the project.

- Invasive, weedy, and non-native herbaceous plant control. Includes chemical and manual treatments for common reed, lyme grass, purple loosestrife, spotted knapweed, and other species.
- Sapling control. Includes chemical treatments for invasive woody species.
- Woody invasive control and debris removal. Includes girdling, cutting and removal/disposal of woody material.
- Prescribed burn planning. Includes designation of burn units within the North Beach dune complex and developing an ongoing burn regimen. Burns will be focused on wetland areas to maintain habitat integrity.
- Prescribed burning. Includes spring burning to set back invasive species and fall burning to improve habitat for native species.
- Re-vegetation of North Beach. Areas where native plants have not been able to colonize due to isolation, invasive species, or human activity will be re-seeded.

The 2012 Habitat Management Plan provides the next steps for terrestrial invasive species control beyond the GLRI Southern Buffer project. This will include post-GLRI project assessment and control work, and planning for additional efforts using Illinois Coastal Management Program and other grant funding, as well as IDNR staff.

Long-term invasive species management will involve the IDNR Coastal Management Program in coordination with the CAG and stakeholders, including support for monitoring, identification of project funding sources, and education and outreach.

Monitoring

Compilation of historic and recent data, as available, on species diversity and populations of taxonomic groups for the AOC and ESA has been completed. Older data sets from when the AOC was originally listed are very limited. The CAG and IDNR have reviewed the available monitoring data and assessed the

data gaps and needs for baseline surveys for some taxa. Under the GLRI Southern Buffer project, the CAG has established baseline data for the dunal plant communities, and will do so for wetland aquatic invertebrates and fish in 2013. They are continuing monitoring of the herpetofauna and birds, including specific Bird Studies Canada monitoring protocols for marsh birds and amphibians. Species specific monitoring continues for endangered, threatened and rare species, including the Piping plover and identified Plants of Concern.

The Habitat Management Plan (2012) provides the outline and funding sources for continuing current habitat, species and taxa monitoring after the GLRI Southern Buffer project is completed. Additional monitoring opportunities are also identified that will improve habitat quality in the future outside the scope of the original BUI remediation.

Supporting Data

Due to sand accumulation east of the harbor and the process of beach community formation and development, approximately 50% more beach and dune habitat is present in the AOC now than when it was originally designated (Figure 1). Over these 30 years, the new coastal communities have developed into high quality habitat, due in part, to the proximity of Illinois Beach State Park (IBSP), which contains the most diverse dunal communities in Illinois.

Vegetation surveys have been conducted at the AOC since 2001. A total of 342 plant species have been identified within the AOC at North Beach, with 218 native species and 9 state listed species (Appendix A). The surveys indicate a highly diverse plant community. Measured using the Swink and Wilhelm Floristic Quality Index, the dunal habitat scores a value of 60. An index of 35 or greater indicates a high-quality natural area.

The proximity to IBSP and the relatively undisturbed habitat and location along a major migratory route make the AOC prime avian habitat. The unique blend of coastal, prairie, woodland and wetland habitat attracts numerous migratory and nesting birds. Bird monitoring has not been done for the AOC alone, but bird data from the AOC and ESA combined since 2008 has been compiled from Bird Studies Canada, National Audubon Society and the Cornell University Lab of Ornithology databases. A total of 214 species were documented within the combined AOC/ESA, which includes birds that are breeding, foraging, or migrating (Appendix B). Of these species, 13 are state listed and 1 is federally listed as endangered. The federally endangered species, *Charadrius melodus* (piping plover) has been observed in the AOC since 2009 and has nested in the ESA.

Bird Studies Canada compared wetlands in the AOC dunes to nearby non-AOC wetlands for bird and amphibian support in 1995-6 (Appendix C). Both bird and amphibian diversity metrics were lower than anticipated at all sites, however the AOC compared favorably to non-AOC reference sites. The report concluded that the AOC was not impaired for bird or amphibian habitat.

Bird observations for the period 2010-2011 were compiled from Bird Studies Canada, National Audubon Society, and the Cornell Ornithology lab databases. Records of species observed in Waukegan Harbor or subunits of the harbor were tallied. Per these observations, four Wetland Indicator Species were sighted, compared to three in the 1995-96 study (table C-1). Wetland Nesting Species observations included 13 species, compared to 12 in the 1995-96 study (table C-2).

Data from a CAG-funded herpetological survey show that the same three Amphibian Indicator Species from the 1995-96 report were still present in 2011 (table C-3).

Fish surveys conducted by the IDNR have focused on Waukegan Harbor and the adjacent waters of Lake Michigan. Waukegan Harbor is designed for commercial boat traffic and therefore provides poor fish habitat. Consequently, fish populations within the harbor are low, and most species are casual visitors. Between 1995 and 2005, 23 fish species have been documented in Waukegan Harbor.

No formal fish surveys have been conducted in the dunal wetlands. Casual observations by IDNR and CAG employees in 2012 have noted at least three species of fish in the wetlands, including the state listed *Fundulus diaphanous* (banded killifish).

Recommendations

In consideration of the actions that have been completed, the strength of the supporting data, and the clear trajectory toward habitat improvements above and beyond those needed to remediate the original impairment, the IDNR recommends the removal of the Habitat Loss BUI. Dunal habitat has increased by approximately 50% in the AOC and data show that these natural communities are diverse, high quality and support a suite of wildlife species equal to or better than similar non-AOC sites. Completed remedial actions for soil and sediment contamination have minimized the threats from toxic chemicals that affect the biology and reproductive potential of species in the AOC. Completed and continuing actions addressing the industrial nature of the AOC, including superfund post-clean up restoration coordination and guidance, is a critical, ongoing measure that prevents potentially devastating long-term habitat impacts. Completed mapping of all natural communities and locations of invasive species is serving as the basis for invasive species control actions that are part of the GLRI Southern Buffer project. Completed and planned floral and faunal monitoring provide both the basis for removing the habitat Loss BUI and baseline data for continued monitoring of the trajectory of progress toward longer-term habitat targets.

Completion of the Habitat Management Plan (2012), which defines causes of impairments, establishes targets, identifies restoration programs and establishes timetables and responsibilities, achieves the specific delisting targets for the Habitat Loss BUI. The completed actions, planned and funded actions, and the management plan together provide the rationale for removal of the BUI. They set the trajectory to continue improvement of habitat conditions beyond what is necessary for removal of the BUI, and provide the framework to maintain those conditions for the next 10 years. In addition to specific habitat progress within the AOC, the management plan requires development of an ESA habitat management plan and tangible progress within the entire ESA to address the larger habitat issues and needs for the Waukegan Area.

Therefore, contingent upon the completion of the current harbor dredging project, and continuation and completion of the GLRI Southern Buffer Restoration Project led by the CAG, IDNR and the Waukegan CAG recommend removal of the Habitat Loss BUI in Waukegan Harbor.

Acronyms/Glossary

<i>AOC(s)</i>	<i>Area(s) of Concern</i> Geographic area that fails to meet General or Specific Objective of the GLWQA where such failure has caused or is likely to cause impairment of beneficial use or the area's ability to support aquatic life.
<i>BUI</i>	<i>Beneficial Use Impairments</i> Those impairments defined in Annex 2 of the November 1987 – Great Lakes Water Quality Agreement. Impairment to a beneficial use means a change in the chemical, physical, or biological integrity of the Great Lakes System preventing or restricting the use.
<i>CAG</i>	<i>Citizens' Advisory Group</i> <i>CAG or Waukegan CAG is a group comprised of local concerned citizens, industry, government, and other local interest groups that work together to advise agencies of local concerns and goals.</i>
<i>ECT</i>	<i>Environmental Consulting & Technology, Inc.</i>
<i>ESA</i>	<i>Expanded Study Area</i>
<i>IDNR</i>	<i>Illinois Department of Natural Resources</i>
<i>IEPA</i>	<i>Illinois Environmental Protection Agency</i>
<i>OMC</i>	<i>Outboard Marine Corporation</i>
<i>PCBs</i>	<i>Polychlorinated Biphenyls</i> PCBs belong to a broad family of man-made organic chemicals known as chlorinated hydrocarbons. PCBs were domestically manufactured from 1929 until their manufacture was banned in 1979. They have a range of toxicity and vary in consistency from thin, light-colored liquids to yellow or black waxy solids. Due to their non-flammability, chemical stability, high boiling point, and electrical insulating properties, PCBs were used in hundreds of industrial and commercial applications including electrical, heat transfer, and hydraulic equipment; as plasticizers in paints, plastics, and rubber products; in pigments, dyes, and carbonless copy paper; and many other industrial applications.
<i>RAP</i>	<i>Remedial Action Plan</i> Plans developed by the states that identify Beneficial Use Impairments and outline the recommended remedial actions to remove the impairments. RAPs set the stage for eventual removal of all of the identified impairments, which will ultimately result in the delisting of AOCs.

References

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Environmental Consulting & Technology. 2008. Delisting Targets for the Waukegan Harbor Area of Concern: Final Report. Submitted to the Illinois Environmental Protection Agency on October 30, 2008

Illinois Department of Natural Resources. 2012. Waukegan Harbor Area of Concern Habitat Management Plan. Report submitted to the USEPA and Waukegan Harbor Citizen's Advisory Group, October, 2012.

Illinois EPA. 1999. Final Stage III Report Waukegan Harbor Remedial Action Plan. Waukegan, Illinois 1999.

International Joint Commission (IJC). United States and Canada. Revised Great Lakes Water Quality Agreement (GLWQA) of 1978 is an Agreement with Annexes and Terms of Reference, between the United States and Canada signed Ottawa, November 22, 1978, and Phosphorous Load Reduction Supplement signed October 16, 1983, as amended by Protocol November 18, 1987. Office Consolidation IJC United States and Canada.

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Appendix A

Floristic Survey of Waukegan Harbor Area of Concern.

Source Data: botanists contracted by the CAG.

Total number of species: 327

Total number of native species: 218

Key:

E=Exotic (non-native) species

F=Federally listed threatened or endangered species (0)

S= State listed threatened or endangered species (9)

<i>Abutilon theophrasti</i> (Velvetleaf) - E	<i>Lathyrus palustris</i> var. <i>myrtifolius</i> (Marsh Vetchling)
<i>Acalypha rhomboidea</i> (Three-seeded Mercury)	<i>Leersia oryzoides</i> (Rice Cut Grass)
<i>Acer negundo</i> (Box Elder)	<i>Lemna minor</i> (Small Duckweed)
<i>Acer saccharinum</i> (Silver Maple)	<i>Leonurus cardiaca</i> (Motherwort) - E
<i>Achillea millefolium</i> (Yarrow) - E	<i>Lepidium campestre</i> (Field Cress) - E
<i>Acnida altissima</i> (Water Hemp)	<i>Lepidium densiflorum</i> (Small Peppergrass) - E
<i>Agalinis purpurea</i> (Purple False Foxglove)	<i>Lepidium virginicum</i> (Common Peppergrass)
<i>Agropyron repens</i> (Quack Grass) - E	<i>Liatris aspera</i> (Rough Blazing Star)
<i>Agrostis alba</i> (Redtop Grass) - E	<i>Linaria vulgaris</i> (Butter-and-eggs) - E
<i>Agrostis alba palustris</i> (Creeping Bent Grass)	<i>Liparis loeselii</i> (Green Twayblade Orchid)
<i>Agrostis hyemalis</i> (Tickle Grass)	<i>Lithospermum croceum</i> (Hairy Puccoon)
<i>Agrostis scabra</i> (Fly-away Grass)	<i>Lolium perenne</i> (Perennial Rye Grass) - E
<i>Ailanthus altissima</i> (Tree of Heaven) - E	<i>Lonicera x bella</i> (Showy Fly Honeysuckle) - E
<i>Alisma subcordatum</i> (Common Water Plantain)	<i>Lotus corniculatus</i> (Bird's Foot Trefoil) - E
<i>Alisma triviale</i> (Large-flowered Water Plantain)	<i>Ludwigia palustris</i> var. <i>americana</i> (Marsh Purslane)
<i>Alliaria petiolata</i> (Garlic Mustard) - E	<i>Lychnis alba</i> (White Campion) - E
<i>Alnus glutinosa</i> (European Alder) - E	<i>Lycopus americanus</i> (Common Water Horehound)
<i>Amaranthus graecizans</i> (Creeping Amaranth) - E	<i>Lycopus asper</i> (Rough Water Horehound)
<i>Amaranthus retroflexus</i> (Rough Amaranth) - E	<i>Lycopus uniflorus</i> (Northern Bugle Weed)
<i>Ambrosia artemisiifolia</i> var. <i>elatior</i> (Common Ragweed)	<i>Lysimachia ciliata</i> (Fringed Loosestrife)
<i>Ammophila breviligulata</i> (Marram Grass) - S	<i>Lythrum salicaria</i> (Purple Loosestrife) - E
<i>Andropogon gerardii</i> (Big Bluestem Grass)	<i>Malva neglecta</i> (Common Mallow) - E
<i>Andropogon scoparius</i> (Little Bluestem Grass)	<i>Medicago lupulina</i> (Black Medick) - E
<i>Anemone canadensis</i> (Meadow Anemone)	<i>Melilotus alba</i> (White Sweet Clover) - E
<i>Anemone virginiana</i> (Thimbleweed)	<i>Melilotus officinalis</i> (Yellow Sweet Clover) - E
<i>Apocynum cannabinum</i> (Indian Hemp)	<i>Mentha arvensis</i> var. <i>villosa</i> (Wild Mint)
<i>Arctium minus</i> (Common Burdock) - E	<i>Mimulus ringens</i> (Monkey Flower)
<i>Arctostaphylos uva-ursi</i> var. <i>coactills</i> (Bearberry) - S	<i>Mirabilis nyctaginea</i> (Wild Four O'clock) - E
<i>Arenaria serpyllifolia</i> (Thyme-leaved Sandwort) - E	<i>Mollugo verticillata</i> (Carpet Weed) - E
<i>Aristida oligantha</i> (Plains Three-awn Grass)	<i>Monarda punctata</i> (Horse Mint)

Artemisia caudata (Beach Wormwood)
Asclepias incarnata (Swamp Milkweed)
Asclepias syriaca (Common Milkweed)
Asclepias tuberosa (Butterfly Weed)
Asclepias verticillata (Whorled Milkweed)
Asparagas officinalis (Asparagus) - E
Aster lateriflorus (Side-flowering Aster)
Aster novae-angliae (New England Aster)
Aster pilosus (Hairy Aster)
Aster ptarmicoides (Stiff Aster)
Aster sagittifolius var. *drummondii* (Drummond's Aster)
Aster simplex var. *interior* (Marsh Aster)
Betula pendula (European White Birch) - E

Betula pumila (Dwarf Birch)
Bidens cernua (Nodding Bur Marigold)
Bidens comosa (Swamp Tickseed)
Bidens connata (Purple-stemmed Tickseed)
Bidens frondosa (Common Beggar's Ticks)
Boehmeria cylindrica (False nettle)
Botrychium virginianum (Rattlesnake Fern)
Bromus inermis (Hungarian Brome) - E
Bromus tectorum (Downy Brome) - E
Cakile edentula (Sea Rocket) - S
Calamagrostis canadensis (Blue Joint Grass)
Calamovilfa longifolia var. *magna* (Sand Reed Grass)
Carduus nutans (Nodding Thistle) - E
Carex brevior (Plains Oval Sedge)
Carex aurea (Golden Sedge) - S
Carex bebbii (Bebb's Oval Sedge)
Carex crawei (Early Fen Sedge)
Carex cristatella (Crested Oval Sedge)
Carex granularis (Pale Sedge)
Carex lacustris (Common Lake Sedge)
Carex muhlenbergii (Sand Bracked Sedge)
Carex normalis (Spreading Oval Sedge)
Carex stipata (Common Fox Sedge)
Carex tenera (Narrow-leaved Oval Sedge)
Carex tribuloides (Awl-fruited Oval Sedge)
Carex viridula (Little Green Sedge) - S
Carex vulpinoidea (Brown Fox Sedge)
Cenchrus longispinus (Sandbur Grass)
Centaureum pulchellum (Showy Centuary) - E

Morus alba (White Mulberry) - E
Muhlenbergia mexicana (Leafy Satin Grass)
Myriophyllum spicatum (European Water Milfoil) - E
Nepeta cataria (Catnip) - E
Oenothera biennis (Common Evening Primrose)
Oenothera clelandii (Sand Evening Primrose)
Onoclea sensibilis (Sensitive Fern)
Oxalis europaea (Tall Wood Sorrel)
Oxalis stricta (Common Wood Sorrel)
Panicum capillare (Old Witch Grass)
Panicum dichotomiflorum (Knee Grass)
Panicum implicatum (Old-field Panic Grass)
Panicum oligosanthes var. *scribnerianum* (Scribner's Panic Grass)
Panicum virgatum (Switch Grass)
Parthenocissus inserta (Thicket Creeper)
Parthenocissus quinquefolia (Virginia Creeper)
Phalaris arundinacea (Reed Canary Grass) - E
Phragmites australis (Common Reed Grass)
Pilea fontana (Bog Clearweed)
Pinus sylvestris (Scotch Pine) - E
Plantago lanceolata (English Plantain) - E
Plantago major (Common Plantain) - E
Plantago rugelii (Red-stalked Plantain)
Poa annua (Annual Blue Grass) - E
Poa compressa (Canada Blue Grass) - E
Poa palustris (Marsh Blue Grass)
Poa pratensis (Kentucky Blue Grass) - E
Poa trivialis (Rough Blue Grass) - E
Polygonum arenastrum (Sidewalk Knotweed) - E
Polygonum convolvulus (Black Bindweed) - E
Polygonum hydropiper (Water Pepper)
Polygonum lapathifolium (Heartsease)
Polygonum persicaria (Lady's Thumb) - E
Polygonum punctatum (Smartweed)
Polygonum scandens (Climbing False Buckwheat)
Populus alba (Silver Poplar) - E
Populus deltoides (Eastern Cottonwood)
Portulaca oleracea (Purslane) - E
Potamogeton crispus (Curly-leaf Pondweed) - E
Potamogeton pectinatus (Comb Pondweed)
Potentilla anserina (Silverweed)
Potentilla fruticosa (Shrubby Cinquefoil)

Centurea maculosa (Spotted Knapweed) - E
Cerastium vulgatum (Mouse-eared Chickweed) - E
Chenopodium album (Lamb's Quarters) - E
Chenopodium glaucum (Oak-leaved Goosefoot) - E
Chrysanthemum leucanthemum var. pinnatifidum (Ox-eye Daisy) - E
Cichorium intybus (Chicory) - E
Cirsium arvense (Canada Thistle) - E
Cirsium vulgare (Bull Thistle) - E
Citrullus lanatus (Watermelon) - E
Convolvulus arvensis (Field Bindweed) - E
Convolvulus sepium (Hedge Bindweed)
Corallorhiza odontorhiza (Late Coral Root) - E
Coreopsis lanceolata (Sand Coreopsis)
Corispermum hyssopifolium (Bugseed)
Cornus obliqua (Blue-fruited Dogwood)
Cornus racemosa (Gray Dogwood)
Cornus stolonifera (Red-osier Dogwood)
Coronilla varia (Crown Vetch) - E
Crataegus crusgalli (Cockspur Hawthorn)
Crataegus mollis (Downy Hawthorn)
Cycloloma atriplicifolium (Winged Pigweed)
Cyperus ferruginescens (Rusty nut Sedge)
Cyperus rivularis (Brook nut Sedge)
Cyperus schweinitzii (Rough Sand Sedge)
Cyperus strigosus (Long-scaled nut Sedge)
Cyperus x mesochorus (Midland Sand Sedge)
Daucus carota (Queen Anne's Lace) - E
Dianthus armeria (Deptford Pink) - E
Digitaria ischaemum (Smooth Crab Grass) - E
Digitaria sanguinalis (Hairy Crab Grass) - E
Diplachne acuminata (Salt-meadow Grass) - E
Diplotaxis muralis (Wall Rocket) - E
Echinochloa crusgalli (Barnyard Grass)
Echinochloa walteri (Salt-marsh Cockspur Grass)
Elaeagnus umbellata (Autumn Olive) - E
Eleocharis acicularis (Needle Spike Rush)
Eleocharis elliptica (Golden-seeded Spike Rush)
Eleocharis erythropoda (Red-rooted Spike Rush)
Elodea canadensis (Common Waterweed)
Elymus arenarius (Lyme Grass) - E
Elymus canadensis (Canada Wild Rye)
Epilobium ciliatum (Northern Willow Herb)
Potentilla norvegica (Rough Cinquefoil)
Potentilla recta (Upright Cinquefoil) - E
Prunus pumila (Sand Cherry)
Prunella vulgaris var. lanceolata (Self Heal)
Prunus americana (Wild Plum)

Prunus serotina (Wild Black Cherry)
Prunus virginiana (Choke Cherry)
Pycnanthemum virginianum (Common Mountain Mint)
Ranunculus longirostris (Water Buttercup)
Ranunculus pensylvanicus (Bristly Buttecup)
Ranunculus sceleratus (Cursed Buttersup)
Rhamnus frangula (Glossy Buckthorn) - E
Rhamnus cathartica (Common Buckthorn) - E
Rhus radicans (Poison Ivy)
Rhus typhina (Staghorn Sumac)
Ribes americanum (Wild Black Currant)
Robinia pseudoacacia (Black Locust) - E
Rosa blanda (Early Wild Rose)
Rosa multiflora (Multiflora Rose) - E
Rubus idaeus var. strigosus (Red Raspberry)
Rubus occidentalis (Black Raspberry)
Rudbeckia hirta (Black-eyed Susan)
Rumex crispus (Curly Dock) - E
Sagittaria cuneata (Arrow-leaved Arrowhead)
Sagittaria latifolia (Common Arrowhead)
Salix amygdaloides (Peach-leaved Willow)
Salix bebbiana (Beaked Willow)
Salix discolor (Pussy Willow)
Salix discolor var. latifolia (Pussy Willow)
Salix eriocephala (Heart-leaved Willow)
Salix glaucophylloides (Blue-leaved Willow)
Salix interior (Sandbar Willow)
Salix nigra (Black Willow)
Salix x glatfelteri (Hybrid Black Willow)
Salix x rubens (Hybrid Crack Willow) - E
Saponaria officinalis ("Bouncing Bet (Soapwort) - E
Satureja arkansana (Low Calamint)
Scirpus pungens (Chairmaker's Rush)
Scutellaria lateriflora (Mad-dog Skullcap)
Scutellaria parvula var. leonardii (Small Skullcap)
Sedum acre (Wall Pepper Sedum) - E
Senecio pauperulus (Balsam Ragwort)

Epipactis helleborine (Helleborine Orchid) - E
Equisetum arvense (Horsetail)
Equisetum hyemale var. affine (Tall Scouring Rush)
Equisetum x ferrissii (Joliet Scouring Rush)
Eragrostis capillaris (Lace Grass)
Eragrostis pectinacea (Small Love Grass)
Erigeron annuus (Annual Fleabane)
Erigeron canadensis (Horseweed)
Erigeron philadelphicus (Marsh Fleabane)
Eupatorium altissimum (Tall Boneset)
Eupatorium maculatum (Spotted Joe Pye Weed)
Eupatorium perfoliatum (Common Boneset)
Eupatorium rugosum (White Snakeroot)
Eupatorium serotinum (Late Boneset)

Euphorbia esula (Leafy Spurge) - E
Euphorbia maculata (Nodding Spurge)
Euphorbia polygonifolia (Seaside Spurge) - S
Euphorbia serpyllifolia (Thyme-leaved Spurge) - E
Euphorbia supina (Spotted Creeping Spurge)
Festuca ovina (Sheep Fescue) - E
Fragaria virginiana (Wild Strawberry)
Fraxinus pennsylvanica var. subintegerrima (Green Ash)
Gaillardia pulchella (Blanket Flower) - E
Galium aparine (Cleavers)
Galium obtusum (Wild Madder)
Galium tictorium (Stiff Bedstraw)
Galium triflorum (Sweet-scented Bedstraw)
Geranium maculatum (Wild Geranium)

Geum aleppicum var. strictum (Yellow Avens)
Geum canadense (Wood Avens)
Habenaria hyperborea var. huronensis (Northern Bog Orchid)
Helianthus petiolaris (Petioled Sunflower) - E
Hemerocallis fulva (Orange Day Lily) - E
Hibiscus trionum (Flower-of-an-hour) - E
Hieracium caespitosum (Field Hawkweed) - E
Hordeum jubatum (Squirrel-tail Grass) - E
Hypericum kalmianum (Kalm's St. John's Wort) - S
Hypericum perforatum (Common St. John's Wort) - E
Impatiens capensis (Orange Jewelweed)
Iris pseudacorus (Yellow Flag) - E

Senecio vulgaris (Common Groundsel) - E
Setaria glauca (Yellow Foxtail) - E
Setaria viridis (Green Foxtail) - E
Silene antirrhina (Sleepy Catchfly)
Silene cserei (Glaucous Campion) - E
Sisymbrium altissimum (Tumble Mustard) - E
Sium suave (Tall Water Parsnip)
Smilacena racemosa (Feathery False Solomon's Seal)
Smilacena stellata (Starry False Solomon's Seal)
Solanum americanum (Black nightshade)
Solanum dulcamara (Bittersweet nightshade) - E
Solidago canadensis (Canada Goldenrod)
Solidago gigantea (Late Goldenrod)
Solidago graminifolia var. nuttallii (Hairy Grass-leaved Goldenrod)
Solidago juncea (Early Goldenrod)
Solidago nemoralis (Old-field Goldenrod)
Solidago ohioensis (Ohio Goldenrod)
Sonchus asper (Spiny Sow Thistle) - E
Sonchus uliginosa (Common Sow Thistle) - E
Sorghastrum nutans (Indian Grass)
Sphenopholis intermedia (Slender Wedge Grass)
Sphenopholis obtusata (Prairie Wedge Grass)
Spiranthes cernua (Nodding Ladies' Tresses)
Sporobolus cryptandrus (Sand Dropseed)
Sporobolus vaginiflorus (Sheathed Rush Grass)
Taraxacum officinale (Common Dandelion) - E
Thalictrum dasycarpum (Purple Meadow Rue)
Thalictrum dasycarpum var. hypoglacum (Smooth Meadow Rue)
Thlaspi arvense (Penny Cress) - E
Tradescantia ohioensis (Common Spiderwort)
Tragopogon dubius (Sand Goat's Beard) - E

Trifolium hybridum (Alsike Clover) - E
Trifolium pratense (Red Clover) - E
Trifolium repens (White Clover) - E
Triplasis purpurea (Sand Grass)
Typha angustifolia (Narrow-leaved Cattail)
Typha x glauca (Hybrid Cattail)
Urtica procera (Tall nettle)
Utricularia vulgaris (Great Bladderwort)
Verbascum thaspus (Common Mullein) - E

Juncus alpinus (Richardson's Rush) - S
Juncus balticus var. *littoralis* (Lake Shore Rush)
Juncus bufonius (Toad Rush)
Juncus dudleyi (Dudley's Rush)
Juncus nodosus (Joint Rush)
Juncus torreyi (Torrey's Rush)
Juniperus communis (Common Juniper) - S
Juniperus virginiana var. *crebra* (Red Cedar)
Lactuca canadensis (Wild Lettuce)
Lactuca seriola (Prickly Lettuce) - E

Verbena bracteata (Creeping Vervain)
Verbena hastata (Blue Vervain)
Verbena stricta (Hoary Vervain)
Verbena urticifolia (Hairy White Vervain)
Veronica arvensis (Corn Speedwell) - E
Viburnum opulus (European Highbush Cranberry) - E
Viola sororia (Common Blue Violet)
Vitis riparia (Riverbank Grape)
Xanthium strumarium (Cocklebur) - E

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Appendix B

Bird Species of Waukegan Harbor AOC, observed since 2008.

Source Data: Bird Studies Canada, National Audubon Society and Cornell Lab of Ornithology databases.

Key:

B=breeds in the AOC/ESA

U=may breed in the AOC/ESA. Breeding habitat is present, but nesting is unconfirmed

T=transient through the AOC/ESA. Birds either use the AOC/ESA as a migratory stopover, as occasional vagrants, or nest in the area and visit the AOC/ESA as foraging habitat.

F=Federally listed threatened or endangered species (1)

S=State listed threatened or endangered species (13)

Total documented species: 214

<i>Acanthis flammea</i> (common redpoll) – T	<i>Larus glaucoides</i> (Iceland gull) - T
<i>Accipiter cooperii</i> (Cooper's hawk) – U	<i>Larus hyperboreus</i> (glaucous gull) - T
<i>Accipiter striatus</i> (sharp-shinned hawk) – T	<i>Larus marinus</i> (great black-billed gull) – T
<i>Actitis macularia</i> (spotted sandpiper) – B	<i>Larus pipixcan</i> (Franklin's gull) - T
<i>Aechmophorus occidentalis</i> (western grebe) - T	<i>Larus thayeri</i> (Thayer's gull) – T
<i>Agelaius phoeniceus</i> (red-winged blackbird) – B	<i>Limnodromus griseus</i> (short-billed dowitcher) – T
<i>Aix sponsa</i> (wood duck) - T	<i>Limosa fedoa</i> (marbled godwit) – T
<i>Ammodramus leconteii</i> (Le Conte's sparrow) – T	<i>Lophodytes cucullatus</i> (hooded merganser) – T
<i>Ammodramus savannarum</i> (grasshopper sparrow)-T	<i>Loxia leucoptera</i> (white-winged crossbill) - T
<i>Anas acuta</i> (northern pintail) - T	<i>Melanerpes carolinus</i> (red-bellied woodpecker) - T
<i>Anas americana</i> (American wigeon) – T	<i>Melanerpes erythrocephalus</i> (red-headed woodpecker)-T
<i>Anas clypeata</i> (northern shoveler) – U	<i>Melanitta americana</i> (black scoter) -T
<i>Anas crecca</i> (green-winged teal) - T	<i>Melanitta fusca</i> (white-winged scoter) – T
<i>Anas discors</i> (blue-winged teal) - B	<i>Melanitta perspicillata</i> (surf scoter) - T
<i>Anas platyrhynchos</i> (mallard) - B	<i>Melospiza georgiana</i> (swamp sparrow) – B
<i>Anas rubripes</i> (American black duck) - T	<i>Melospiza lincolnii</i> (Lincoln's sparrow) – T
<i>Anas strepera</i> (gadwall) - T	<i>Melospiza melodia</i> (song sparrow) – U
<i>Anthus rubescens</i> (American pipit) - T	<i>Mergus merganser</i> (common merganser) – T
<i>Archilochus colubris</i> (ruby-throated hummingbird)-U	<i>Mergus serrator</i> (red-breasted merganser) – T
<i>Ardea alba</i> (great egret) – T	<i>Mimus polyglottos</i> (northern mockingbird) – T
<i>Ardea herodias</i> (great blue heron) - T	<i>Mniotilta varia</i> (black-and-white warbler) – T
<i>Arenaria interpres</i> (ruddy turnstone) – T	<i>Molothrus ater</i> (brown-headed cowbird) – U
<i>Asio flammeus</i> (short-eared owl) – T, S	<i>Myiarchus crinitus</i> (great crested flycatcher)
<i>Aythya affinis</i> (lesser scaup) – T	<i>Numenius phaeopus</i> (whimbrel) – T
<i>Aythya americana</i> (redhead) - T	<i>Nyctea scandiaca</i> (snowy owl) – T
<i>Aythya collaris</i> (ring-necked duck) - T	<i>Nycticorax nycticorax</i> (black-crowned night heron) – U, S
<i>Aythya marila</i> (greater scaup) – T	<i>Oreothlypis celata</i> (orange-crowned warbler) – T

Bombycilla cedrorum (cedar waxwing) - T
Botaurus lentiginosus (American bittern) – B, S
Branta canadensis (Canada goose) - B
Branta hutchinsii (cackling goose) – T
Bucephala albeola (bufflehead) – T
Bucephala clangula (common goldeneye) – T
Buteo jamaicensis (red-tailed hawk) – U
Buteo lagopus (rough-legged hawk) - T
Buteo platypterus (broad-winged hawk) – T
Butorides virescens (green heron) - U
Calcarius lapponicus (Lapland longspur) – T
Calidris alba (sanderling) – T
Calidris alpina (dunlin) – T
Calidris bairdii (Baird’s sandpiper) – T
Calidris fuscicollis (white-rumped sandpiper) – T
Calidris maritima (purple sandpiper) – T
Calidris melanotos (pectoral sandpiper) – T
Calidris minutilla (least sandpiper) – T
Calidris pusilla (semipalmated sandpiper) – T
Cardellina canadensis (Canadian warbler) – T
Cardellina pusilla (Wilson’s warbler) – T
Cardinalis cardinalis (northern cardinal) – B
Carpodacus mexicanus (house finch) – U
Carpodacus purpureus (purple finch) – T
Cathartes aura (turkey vulture) – T
Catharus fuscescens (veery) – T
Catharus guttatus (hermit thrush) – T
Catharus minimus (gray-cheeked thrush) – T
Catharus ustulatus (Swainson’s thrush) – T
Certhia americana (brown creeper) – T
Ceryle alcyon (belted kingfisher) – U
Chaetura pelagic (chimney swift) – B
Charadrius melodus (piping plover) – B, F
Charadrius semipalmatus (semipalmated plover) – T
Charadrius vociferous (killdeer) – B
Chlidonias niger (black tern) – U, S
Chordeiles minor (common nighthawk) – B
Chroicocephalus philadelphia (Bonaparte’s gull) – T
Circus cyaneus (northern harrier) – U, S
Cistothorus palustris (marsh wren) – B
Cistothorus platensis (sedge wren) – U
Clangula hyemalis (long-tailed duck) – T
Coccyzus erythrophthalmus (black-billed cuckoo) – T, S
Oreothlypis peregrine (Tennessee warbler) – T
Oreothlypis ruficapilla (Nashville warbler) – T
Oxyura jamaicensis (ruddy duck) – T
Pandion haliaetus (osprey) – U, S
Parkesia noveboracensis (northern waterthrush) – T
Passer domesticus (house sparrow) – B
Passerculus sandwichensis (savannah sparrow) – U
Passerella iliaca (fox sparrow) – T
Passerina cyanea (indigo bunting) – U
Petrochelidon pyrrhonota (cliff swallow) – U
Phalacrocorax auritus (double crested cormorant) – T
Picoides pubescens (downy woodpecker) – U
Pipilo erythrophthalmus (eastern towhee) – U
Piranga olivacea (scarlet tanager) - T
Plectrophenax nivalis (snow bunting) – T
Pluvialis dominica (American golden-plover) - T
Pluvialis squatarola (black-bellied plover) – T
Podiceps auritus (horned grebe) – T
Podilymbus podiceps (pie-billed grebe) – B
Poecile atricapillus (black-capped chickadee) – U
Poliophtila caerulea (blue-gray gnatcatcher) – U
Poocetes gramineus (vesper sparrow) – T
Porzana carolina (sora) – B
Progne subis (purple martin) – U
Quiscalus quiscula (common grackle) – B
Rallus limicola (Virginia rail) – B
Recurvirostra americana (American avocet) – T
Regulus calendula (ruby-crowned kinglet) – T
Regulus satrapa (golden-crowned kinglet) – T
Riparia riparia (bank swallow) – B
Sayornis phoebe (eastern phoebe) – U
Scolopax minor (American woodcock) – B
Seiurus aurocapillus (ovenbird) – T
Setophaga caeruleascens (black-throated blue warbler) – T
Setophaga castanea (bay-breasted warbler) – T
Setophaga coronata (yellow-rumped warbler) – T
Setophaga fusca (Blackburnian warbler) – T
Setophaga magnolia (magnolia warbler) – T
Setophaga palmarum (palm warbler) – T
Setophaga pensylvanica (chestnut-sided warbler) – T
Setophaga petechia (yellow warbler) – U
Setophaga ruticilla (American redstart) – U
Setophaga striata (blackpoll warbler) – T

Colaptes auratus (northern flicker) – U
Columba livia (rock pigeon) – U
Contopus cooperi (olive-sided flycatcher) – T
Contopus virens (eastern wood-pewee) – T
Corvus brachyrhynchos (American crow) – U
Cyanocitta cristata (blue jay) – T
Cygnus buccinator (trumpeter swan) – T
Cygnus columbianus (tundra swan) – T
Dendroica petechia (yellow warbler) – B
Dumetella carolinensis (gray catbird) – U
Egretta caerulea (little blue heron) – T, S
Egretta tricolor (tricolored heron) – T
Empidonax alnorum (alder flycatcher) – T
Empidonax flaviventris (yellow-bellied flycatcher) – T
Empidonax minimus (least flycatcher) – T
Empidonax traillii (willow flycatcher) – B
Empidonax virescens (Acadian flycatcher) – T
Eremophila alpestris (horned lark) – T
Euphagus cyanocephalus (Brewer's blackbird) – T
Falco columbarius (merlin) – T
Falco peregrinus (peregrine falcon) – B, S
Falco sparverius (American kestrel) – U
Fulica americana (American coot) – B
Gallinago delicata (Wilson's snipe) – B
Gavia immer (common loon) – T
Gavia stellata (red-throated loon) – T
Geothlypis philadelphia (mourning warbler) – T
Geothlypis trichas (common yellowthroat) – T
Grus canadensis (sandhill crane) – T, S
Haliaeetus leucocephalus (bald eagle) – T
Hirundo rustica (barn swallow) – B
Icterus galbula (Baltimore oriole) – U
Icterus spurius (orchard oriole) – B
Junco hyemalis (dark-eyed junco) – T
Larus argentatus (herring gull) – U
Larus delawarensis (ring-billed gull) – B
Larus fuscus (lesser black-billed gull) – T
Setophaga tigrina (Cape May warbler) – T
Setophaga virens (black-throated green warbler) – T
Sialia currucoides (mountain bluebird) – T
Sialia sialis (eastern bluebird) – U
Sitta canadensis (red-breasted nuthatch) – T
Sitta carolinensis (white-breasted nuthatch) – T
Sphyrapicus varius (yellow-bellied sapsucker) – U
Spinus pinus (pine siskin) – T
Spinus tristis (American goldfinch) – B
Spiza americana (dickcissel) – U
Spizella arborea (tree sparrow) – T
Spizella passerina (chipping sparrow) – U
Spizella pusilla (field sparrow) – U
Stelgidopteryx serripennis (northern rough-winged swallow) – B
Sterna caspia (Caspian tern) – T
Sterna forsteri (Forster's tern) – U, S
Sterna hirundo (common tern) – T, S
Sturnella magna (eastern meadowlark) – U
Sturnus vulgaris (European starling) – U
Tachycineta bicolor (tree swallow) – B
Toxostoma rufum (brown thrasher) – T
Tringa flavipes (lesser yellowlegs) – T
Tringa melanoleuca (greater yellowlegs) – T
Tringa semipalmata (willet) – T
Tringa solitaria (solitary sandpiper) – T
Troglodytes aedon (house wren) – U
Troglodytes hiemalis (winter wren) – T
Tryngites subruficollis (buff-breasted sandpiper) – T
Turdus migratorius (American robin) – U
Tyrannus tyrannus (eastern kingbird) – B
Tyto alba (barn owl) – T, S
Vireo gilvus (warbling vireo) – B
Vireo olivaceus (red-eyed vireo) – U
Vireo solitarius (blue-headed vireo) – T
Zenaidura macroura (mourning dove) – B
Zonotrichia albicollis (white-throated sparrow) – T
Zonotrichia leucophrys (white-crowned sparrow) – T

Appendix C

Table C-1. Bird Studies Canada marsh bird indicator species presence in Waukegan Harbor Area of Concern, 1995 vs. 2011.

	Occurrence	
	1995	2011
<i>Anas discors</i> (blue-winged teal)		
<i>Botaurus lentiginosus</i> (American bittern)		
<i>Chlidonias niger</i> (black tern)		
<i>Cistothorus palustris</i> (marsh wren)		
<i>Fulica americana</i> (American coot)		
<i>Gallinago delicata</i> (Wilson's snipe)		
<i>Gallinula galeata</i> (common gallinula)		
<i>Ixobrychus exilis</i> (least bittern)		
<i>Podilymbus podiceps</i> (pie-billed grebe)		
<i>Porzana carolina</i> (sora)		
<i>Rallus limicola</i> (Virginia rail)		

Table C-2. Bird Studies Canada marsh nester bird species presence in Waukegan Harbor Area of Concern, 1995 vs. 2011.

Species Name - Marsh Nesters	Occurrence	
	1995	2011
<i>Agelaius phoeniceus</i> (red-winged blackbird)		
<i>Anas discors</i> (blue-winged teal)		
<i>Anas platyrhynchos</i> (mallard)		
<i>Botaurus lentiginosus</i> (American bittern)		
<i>Branta canadensis</i> (Canada goose)		
<i>Empidonax traillii</i> (willow flycatcher)		
<i>Fulica americana</i> (American coot)		
<i>Geothlypis trichas</i> (common yellowthroat)		
<i>Melospiza georgiana</i> (swamp sparrow)		
<i>Melospiza melodia</i> (song sparrow)		
<i>Porzana carolina</i> (sora)		
<i>Quiscalus quiscula</i> (common grackle)		
<i>Setophaga petechia</i> (yellow warbler)		
<i>Tyrannus tyrannus</i> (eastern kingbird)		

Amphibian and Reptile Species of the Waukegan Harbor AOC, Observed in 2011.

Source Data: Bird Studies Canada, herpetologists contracted by the CAG.

Apalone spinifera (spiny softshell turtle)
Bufo americanus (American toad)
Chelydra serpentina (snapping turtle)
Chrysemys picta (painted turtle)
Pseudacris triseriata (chorus frog)
Rana clamitans (green frog)
Rana pipiens (northern leopard frog)
Thamnophis sirtalis (common garter snake)

Table C-3. Bird Studies Canada amphibian indicator species presence in Waukegan Harbor Area of Concern, 1995 vs. 2011.

Species Name	Occurrence	
	1995	2011
<i>Bufo americanus</i> (American toad)		
<i>Pseudacris crucifer</i> (spring peeper)		
<i>Pseudacris triseriata</i> (chorus frog)		
<i>Rana pipiens</i> (northern leopard frog)		
<i>Rana palustris</i> (pickerel frog)		