

Appendix 9.11: Malchow/Olson Tract

Written by Erin Giese and Dr. James Horn

Location (centroid)	Lat. 44.599540°, Lon. -88.017854° ¹ (NAD 1983, UTM Zone 16N)																														
Total Area (ha)	139.01 ha																														
Area Public Land (ha)	0 ha - This entire property privately owned, though it is surrounded by publicly-owned land.																														
Area of Habitat Types Present (ha) and Percent of Each Habitat Type	<p>Dominant Habitat Types: These habitat types were documented during a July 2015 habitat mapping effort led by the University of Wisconsin-Green Bay Cofrin Center for Biodiversity (CCB) across the Lower Green Bay and Fox River Area of Concern (LGB&FR AOC)³. Habitat types within the Malchow/Olson Tract are displayed as a static map at the bottom of this document. Note that the extent of submergent marsh was refined by the CCB's 2017 submerged aquatic vegetation field surveys. There is a total of 118.64 ha of natural habitat within Malchow/Olson Tract.</p> <table border="1"> <thead> <tr> <th>Habitat Type</th> <th>Area (ha)</th> <th>Percent</th> </tr> </thead> <tbody> <tr> <td>Emergent Marsh (High Energy Coastal)</td> <td>21.30</td> <td>17.96</td> </tr> <tr> <td>Emergent Marsh (Inland)</td> <td>1.57</td> <td>1.33</td> </tr> <tr> <td>Green Bay Open Water</td> <td>4.79</td> <td>4.04</td> </tr> <tr> <td>Hardwood Swamp</td> <td>43.92</td> <td>37.02</td> </tr> <tr> <td>Northern Mesic Forest</td> <td>7.94</td> <td>6.69</td> </tr> <tr> <td>Open Water Inland</td> <td>0.88</td> <td>0.74</td> </tr> <tr> <td>Shrub Carr</td> <td>20.18</td> <td>17.01</td> </tr> <tr> <td>Submergent Marsh</td> <td>16.65</td> <td>14.04</td> </tr> <tr> <td>Tributary Open Water</td> <td>1.40</td> <td>1.18</td> </tr> </tbody> </table> <p><i>Disclaimer!</i> Because this priority area is located within the Great Lakes coastal zone, the amount of habitat types can vary drastically across years and even within years (or months) due to changing Great Lakes water levels, precipitation, and seiche. Within this priority area specifically, the amounts of emergent and submergent marsh are known to fluctuate significantly from year to year and within years. The habitat types listed above and mapped below are based on a field effort conducted in July 2015. Plants recorded in the "Natural Habitat Communities and Significant Plants" section were primarily documented in July 2015, late summer/fall 2016 and 2017. Great Lakes water levels were much higher in 2016 and 2017 than in July 2015.</p>	Habitat Type	Area (ha)	Percent	Emergent Marsh (High Energy Coastal)	21.30	17.96	Emergent Marsh (Inland)	1.57	1.33	Green Bay Open Water	4.79	4.04	Hardwood Swamp	43.92	37.02	Northern Mesic Forest	7.94	6.69	Open Water Inland	0.88	0.74	Shrub Carr	20.18	17.01	Submergent Marsh	16.65	14.04	Tributary Open Water	1.40	1.18
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General Description	<p>The Malchow/Olson Tract is a relatively large, privately owned priority area located along the west shore of the bay of Green Bay just south of Longtail Point, which constitutes the LGB&FR AOC northwestern-most border. Since the late 1890s (estimated), this land has been owned by the descendants of the now deceased William and Gordon Malchow³². Before Gordon and his wife Ethel Malchow died, their one wish was for their children to protect this family property for the purposes of wildlife preservation³². Thanks to this family's perseverance, led by Eileen Olson (Gordon and Ethel Malchow's daughter) and her relatives, the Malchow/Olson Tract has largely been untouched and undisturbed over the past 100+ years with the exception of the family's farmland and houses. Like much of the west shore, it primarily consists of Tedrow loamy fine sand and Roscommon muck soils². Within the entire LGB&FR AOC, parts of this property's emergent marsh and nearly all of its hardwood swamp have the</p>																														

¹ File "AOC_PriorityAreas.v09_20171212.shp"

² Soil Survey Geographic (SSURGO) by the United States Department of Agriculture's Natural Resources Conservation Service. Published Dec 2010. Available: <http://uwgb.maps.arcgis.com/home/item.html?id=204d94c9b1374de9a21574c9efa31164>; accessed 1 Nov 2016.

	<p>highest ecological quality for these habitat types because they have high native plant diversity and little to no invasives⁴. It is one of the few places in the LGB&FR AOC that still contains the historical mosaic of submergent and emergent marsh that naturally grades into southern sedge meadow, shrub carr, and hardwood swamp^{3,4,5}. It provides critical habitat for northern pike (<i>Esox lucius</i>), muskrats, breeding and migratory birds, and migratory waterfowl offshore and is a refuge for many native plants that are locally uncommon to the LGB&FR AOC^{3,4,7,8,9,40}. A few invasive plants have been found here in recent years, including <i>Phragmites australis</i> (common reed; hereafter referred to as “<i>Phragmites</i>”) and reed canary grass (<i>Phalaris arundinacea</i>)^{3,4}, however, the Wisconsin Department of Natural Resources (WDNR) has treated <i>Phragmites</i> in 2011-2012 with aerial spraying and on the ground treatment in 2015-2016⁴³. Because of these efforts, the amount of <i>Phragmites</i> present today is very minimal⁴. Fish, plants, birds, and anurans (frogs + toads) have been sampled at this site in the past several years, though additional research and monitoring are still needed⁴⁰. Based on what is currently known, every effort should be made to protect this property because it provides essential fish and wildlife habitat, which helps support sustainable health fish and wildlife populations within the LGB&FR AOC.</p>
<p>Special Features</p>	<ul style="list-style-type: none"> • Comprises a natural, relatively undisturbed landscape of emergent marsh that grades into southern sedge meadow, shrub carr, and hardwood swamp; this landscape describes the historical mosaic originally found in lower Green Bay^{3,4,5}. • Contains the best coastal emergent marsh in terms of ecological quality in the entire LGB&FR AOC because of its high native plant diversity. This marsh is largely dominated by soft-stem bulrush (<i>Schoenoplectus tabernaemontani</i>) and blue-joint grass (<i>Calamagrostis canadensis</i>)⁴. • Contains a high quality swamp white oak (<i>Quercus bicolor</i>) hardwood swamp with a dense understory of the native shrub, common winterberry (<i>Ilex verticillata</i>)⁴. • Contains one of the largest stretches of shrub carr in the LGB&FR AOC that is dominated by speckled alder (<i>Alnus incana</i>) and an appreciable patch of southern sedge meadow (perhaps best considered a ‘tussock meadow,’ as it is c. 85% dominated by the tussock-forming blue-joint grass, a rare habitat in the LGB&FR AOC and across the state⁴. • Provides important spawning habitat and migration corridors for northern pike (<i>Esox lucius</i>)^{40,42}. • Important habitat for muskrats in the emergent marsh⁶. • Significant breeding habitat for many forest and marsh-nesting bird species⁷ and migratory habitat for waterfowl and songbirds^{7,8}.
<p>Natural Habitat Communities and Significant Plants (ordered in terms of ecological importance and size/amount)</p>	<p>Approximately half of the Malchow/Olson Tract consists of emergent high energy marsh, which is found across the eastern edge of this priority area’s boundary⁴. Although some invasive plants have been here for a few years (e.g., <i>Phragmites</i>, hybrid cattail [<i>Typha x glauca</i>]), <i>Phragmites</i> has recently been treated by the WDNR in 2011-2012 and 2015-2016⁴³. Because of these herbicide treatments, an extremely high diversity of native forbs and graminoids can be found in place of the <i>Phragmites</i>, especially in the highest quality portion of the marsh (located in the central portion of this priority area)⁴. This section of the marsh is by far the best emergent marsh in the entire LGB&FR AOC in terms of plant diversity⁴. Natives include⁴:</p> <ul style="list-style-type: none"> • Soft-stem bulrush (<i>Schoenoplectus tabernaemontani</i>), moderately common • Blue-joint grass (<i>Calamagrostis canadensis</i>), moderately common • Canadian rush (<i>Juncus canadensis</i>), rare • Marsh bellflower (<i>Campanula aparinoides</i>), rare • Swamp loosestrife (<i>Decodon verticillatus</i>), rare

³ LGB&FR AOC 2015 habitat field mapping effort

⁴ LGB&FR AOC 2016 botanical surveys

⁵ Bertrand et al. 1976: The Green Bay Watershed Past/Present/Future.

⁶ Wisconsin Department of Natural Resources 2015 muskrat house survey

⁷ LGB&FR AOC comprehensive biota database: file “AOCBiota_DB_ShareableVersion_20161006.accdb”

⁸ LGB&FR AOC 2016 migratory waterfowl surveys

- Bulblet water-hemlock (*Cicuta bulbifera*), rare
- Bristly sedge (*Carex comosa*), rare
- False dragonhead (*Physostegia virginiana*), rare
- Hemlock water-parsnip (*Sium suave*), rare

The second largest habitat type is **hardwood swamp**, which is located along the western edge of the Malchow/Olson Tract from Oak Ridge Lane to the north and Lineville Road to the south⁴.

- Along the northcentral and northwestern edges of this priority area is a hardwood swamp largely dominated by red maple (*Acer rubrum*) in the canopy and with a moderate subcanopy of common serviceberry (*Amelanchier arborea*). Shrubs are largely absent here, but the herbaceous understory is exceptionally well developed and unusual in being dominated by a diversity of fern species, including sensitive fern (*Onoclea sensibilis*), royal fern (*Osmunda regalis*), interrupted fern (*Osmunda claytoniana*), and marsh fern (*Thelypteris palustris*). This hardwood swamp is one of the best in the entire LGB&FR AOC and contains an impressive diversity of other herbaceous natives, including interior sedge (*Carex interior*), weak sedge (*Carex debilis*), big white trillium (*Trillium grandiflorum*), and the uncommon, WI special concern species, marsh bedstraw (*Galium palustre*). Significantly, invasive plant species are almost absent here.
- In the center of the property to the west of Dirt Road is a green ash-dominated hardwood swamp with a relatively thick understory of common winterberry and other natives:
 - Fowl manna grass (*Glyceria striata*), moderately common
 - Small-spike false nettle (*Boehmeria cylindrica*), moderately common
 - Sensitive fern (*Onoclea sensibilis*), moderately common
 - Common hop sedge (*Carex lupulina*), rare
 - Greater bladder sedge (*Carex intumescens*), rare
 - Needle spike-rush (*Eleocharis acicularis*), rare
- In the southcentral third of the property, there a swamp white oak hardwood swamp with some green ash and white birch, though a relatively dense understory of the invasive shrub, glossy buckthorn (*Frangula alnus*).

The Malchow/Olson Tract also contains one of the largest, continuous stretches of **shrub carr** in the LGB&FR AOC³. Unlike much shrub carr vegetation in this region today, the shrub carr here is largely dominated by speckled alder (*Alnus incana*)⁴. Most of it is adjacent to the high energy emergent marsh, though some surrounds a small pond in the southwestern corner. Although some reed canary grass and other invasives can be found here, many natives are present⁴:

- Blue-joint grass (*Calamagrostis canadensis*), moderately common
- Lake sedge (*Carex lacustris*), moderately common
- Small-spike false nettle (*Boehmeria cylindrica*), moderately common
- Marsh pea (*Lathyrus palustris*), rare
- Meadow willow (*Salix petiolaris*), rare
- Red-osier dogwood (*Cornus sericea*), rare
- Peach-leaved willow (*Salix amygdaloides*), rare
- Common three-square bulrush (*Schoenoplectus pungens*), rare

Off the shore of the Malchow/Olson Tract, at the eastern periphery of this priority area, is a continuous band of **submergent marsh**. Submergent marsh also extends up an unnamed creek that flows through the property into the bay of Green Bay. Two invasive submergent macrophytes occur in this priority area. Eurasian water-milfoil (*Myriophyllum spicatum*) is present throughout, and may be locally common. Curly-leaf pondweed (*Potamogeton crispus*) is also present here (and rare) but only in the creek. Native submergent macrophyte dominants of these marshes are coontail (*Ceratophyllum demersum*), common bladderwort (*Utricularia vulgaris*), and sago pondweed (*Stuckenia pectinata*). Turion duckweed (*Lemna turionifera*) is the most

	<p>common duckweed species. Noteworthy rare species include water star-grass (<i>Heteranthera dubia</i>), which reaches the northern limit of its distribution along the west shore near the northern boundary of this priority area, and water celery (<i>Vallisneria americana</i>). Overall, the submergent marshes of the Malchow/Olson Tract are of moderate quality relative to those of other priority areas in the LGB&FR AOC.</p> <p>The largest, contiguous tract of southern sedge meadow in the entire LGB&FR AOC is found on the southeastern section of the Malchow/Olson Tract. This sedge meadow has a very low proportional coverage by invasive species, with reed canary grass (<i>Phalaris arundinacea</i>) being the most prominent of such species here. Despite being termed a sedge meadow, by far the most abundant species (>85% coverage) is blue-joint grass (<i>Calamagrostis canadensis</i>), a tussock-forming grass species. Sedges occur here in much lower abundance (c. 5% coverage), with common tussock sedge (<i>Carex stricta</i>) and common lake sedge (<i>Carex lacustris</i>) most prominent. Spotted joe-pye-weed (<i>Eutrochium maculatum</i>) occurs at a technically rare proportion here but, nevertheless, emerges above the graminoid layer to make a conspicuous show. Although the diversity of forbs is limited in the sedge meadow, the size, relative intactness, and overall rarity of this plant community type in the LGB&FR AOC substantiate it as an area of outstanding ecological significance in the LGB&FR AOC.</p> <p>Northern mesic forest can be found in the northcentral section of the property near the hardwood swamps. It consists of a somewhat open canopy of red maple with no woody understory, and has a discontinuous herbaceous layer that mostly consists of Pennsylvania sedge (<i>Carex pensylvanica</i>).</p> <p>There is a small, inland emergent marsh that is located in the southwestern corner and was recently restored by the Brown County's Land and Water Conservation Department to provide spawning habitat for northern pike⁴². This wetland has reed canary grass, hybrid cattail, swamp milkweed (<i>Asclepias incarnata</i>), blue vervain (<i>Verbena hastata</i>), and spotted joe-pye-weed (<i>Eutrochium maculatum</i>)³. There is also some submergent marsh in the open water part of the pond³.</p> <p>A small wet meadow / surrogate grassland (old field) is located in the southern third of the property just west of Dirt Road that is mostly reed canary grass, though many natives are present, including:</p> <ul style="list-style-type: none"> • Sensitive fern (<i>Onoclea sensibilis</i>), moderately common • Blue-joint grass (<i>Calamagrostis canadensis</i>), moderately common • Wool grass (<i>Scirpus cyperinus</i>), moderately common • Sweet-flag (<i>Acorus americanus</i>), rare • Black willow (<i>Salix nigra</i>), rare <p>Lastly, there is a very small patch of Great Lakes barrens with a sparse canopy of red maple, white pine (<i>Pinus strobus</i>), and red oak (<i>Quercus rubra</i>) and an open understory of black huckleberry (<i>Gaylussacia baccata</i>) and bracken fern (<i>Pteridium aquilinum</i> var. <i>latiusculum</i>). Northern oak sedge (<i>Carex deflexa</i>) and Pennsylvania sedge (<i>Carex pensylvanica</i>) are occasional graminoids here. At the ecotone between the pine barrens and adjacent, red maple swamp forest, grows a tiny and curious plant, the twining screw-stem (<i>Bartonia paniculata</i>), which is a WI special concern species that was not known to occur in Brown County prior to UW-Green Bay's plant surveys.</p> <p>The patches of surrogate grassland (old field) and Great Lakes pine barrens are very small and were therefore not digitized or mapped during the 2015 LGB&FR AOC field effort, which is why they are not shown in the habitat map below.</p>
<p>Significant Animals</p>	<p>Birds:</p> <ul style="list-style-type: none"> • Over 200 bird species have been recorded along the west shore in between Oak Ridge Lane and Peters Marsh across all seasons, including⁷:

	<ul style="list-style-type: none"> ○ Four state endangered species (Caspian Tern [<i>Hydroprogne caspia</i>], Common Tern [<i>Sterna hirundo</i>], Forster's Tern [<i>Sterna forsteri</i>], and Peregrine Falcon [<i>Falco peregrinus</i>]) ○ Three state threatened species (Great Egret [<i>Ardea alba</i>], Acadian Flycatcher [<i>Empidonax virescens</i>], and Cerulean Warbler [<i>Setophaga cerulea</i>]) ○ Thirty-eight Wisconsin Wildlife Action Plan Species of Greatest Concern (e.g., Brown Thrasher [<i>Toxostoma rufum</i>], Canada Warbler [<i>Cardellina canadensis</i>]) ○ Forty-six state special concern species (e.g., Yellow-billed Cuckoo [<i>Coccyzus americanus</i>], Bald Eagle [<i>Haliaeetus leucocephalus</i>], Black-throated Blue Warbler [<i>Setophaga caerulescens</i>], Purple Martin [<i>Progne subis</i>]) ○ Seven International Union for Conservation of Nature-listed species as vulnerable (e.g., Rusty Blackbird [<i>Euphagus carolinus</i>]) or near threatened (e.g., Golden-winged Warbler [<i>Vermivora chrysoptera</i>], Red-headed Woodpecker [<i>Melanerpes erythrocephalus</i>]) ○ Migratory waterfowl and gulls, including Pied-billed Grebe (<i>Podilymbus podiceps</i>) and Bonaparte's Gull (<i>Chroicocephalus philadelphia</i>), use offshore waters and emergent marsh; migratory landbirds use the marsh and forest habitats (e.g., Gray-cheeked Thrush [<i>Catharus minimus</i>], raptors³⁷) ○ Although not well documented, several species are known* or expected to breed on the Malchow/Olson Tract, especially marsh and forest birds: <ul style="list-style-type: none"> ▪ Marsh-nesters: Tree Swallow (<i>Tachycineta bicolor</i>)*, Purple Martin*, Red-winged Blackbird (<i>Agelaius phoeniceus</i>)*, Sedge Wren (<i>Cistothorus platensis</i>), Marsh Wren (<i>Cistothorus palustris</i>), Virginia Rail (<i>Rallus limicola</i>), Swamp Sparrow (<i>Melospiza georgiana</i>), and Wilson's Snipe (<i>Gallinago delicata</i>) ▪ Forest-nesters: American Woodcock (<i>Scolopax minor</i>), Hairy Woodpecker (<i>Picoides villosus</i>), Northern Flicker (<i>Colaptes auratus</i>), and Wood Thrush (<i>Hylocichla mustelina</i>) <p>Fish:</p> <ul style="list-style-type: none"> ● Twenty-eight fish species have been recorded offshore near the Malchow/Olson Tract and Longtail Point in Dead Horse Bay⁹: <ul style="list-style-type: none"> ○ Gizzard shad (<i>Dorosoma cepedianum</i>) ○ Trout perch (<i>Percopsis omiscomaycus</i>) ○ White bass (<i>Morone chrysops</i>) ○ Yellow perch (<i>Perca flavescens</i>) ○ Sheepshead (<i>Aplodinotus grunniens</i>; aka freshwater drum) ○ Walleye (<i>Sander vitreus</i>) ○ Spottail shiner (<i>Notropis hudsonius</i>) ○ Northern pike, known to migrate from Bay of Green Bay into streams, inlets, or roadside ditch channels along the west shore and spawn in small wetlands; northern pike are extremely common along the southern edge of the Malchow/Olson Tract where they travel in roadside ditches to a recently restored inland wetland in the southwestern corner of this priority area^{40,42}. ○ Spotted musky (<i>Esox masquinongy</i>; aka muskellunge) ○ Banded killifish (<i>Fundulus diaphanous</i>), a state special concern species and Wisconsin Wildlife Action Plan Species of Greatest Concern <p>Mammals:</p> <ul style="list-style-type: none"> ● Although ~50 mammal species are known to or are expected to occur along the west shore (e.g., American mink [<i>Neovison vison</i>], red fox [<i>Vulpes vulpes</i>], North
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⁹ Wisconsin Department of Natural Resources Fish Trawling Survey Data 1980-2015; sampling points located offshore to south of the Point.

	<p>American river otter [<i>Lontra canadensis</i>]; as noted in Roznik 1979)³⁷, only eastern cottontail (<i>Sylvilagus floridanus</i>) has been officially recorded along the west shore in between Oak Ridge Lane and Peters Marsh in recent years.</p> <p>Anurans:</p> <ul style="list-style-type: none"> • Three frog and toad species, which likely breed within the Malchow/Olson Tract, include: <ul style="list-style-type: none"> ◦ American toad (<i>Bufo americanus</i>), eastern gray treefrog (<i>Hyla versicolor</i>), and spring peeper (<i>Pseudacris crucifer</i>). • Eastern tiger [<i>Ambystoma tigrinum</i>] and blue-spotted salamanders [<i>Ambystoma laterale</i>] are expected to occur along the west shore of Green Bay (as noted in Roznik 1979)³⁷, though neither has been officially reported on the Malchow/Olson Tract. <p>Reptiles:</p> <ul style="list-style-type: none"> • Although not well studied, several reptiles are expected to occur along the west shore of Green Bay (as noted in Roznik 1979)³⁷: common garter snake [<i>Thamnophis sirtalis</i>], eastern snapping turtle [<i>Chelydra serpentina</i>], etc.
Habitat Quality	<p>Overall, the ecological quality of the Malchow/Olson Tract is very high, particularly because it contains the best high energy emergent marsh and swamp white oak hardwood swamp found within the whole LGB&FR AOC. These habitats generally have high native plant diversities and relatively few invasive plant species. Invasive plants that are present are typically found along the edges (e.g., reed canary grass) or have been treated by the WDNR (e.g., <i>Phragmites</i>)⁴³. The Malchow/Olson Tract comprises a natural, relatively undisturbed landscape of emergent marsh that grades into southern sedge meadow, shrub carr, and hardwood swamp; this landscape describes the historical mosaic originally found in lower Green Bay and is fairly uncommon in the LGB&FR AOC^{3,4,5}. Plus, this property is relatively undeveloped and has had little to no management or disturbance within the past 100+ years.</p> <p>Parts of the high energy emergent marsh are dominated by soft-stem bulrush and blue-joint grass, two natives that were historically common in lower Green Bay. Along the northcentral and northwestern edges is a red maple hardwood swamp with an herbaceous understory of sensitive fern, royal fern, and junberries. A green ash hardwood swamp located in the center of the property has an understory of common winterberry; whereas, most forest understories in the LGB&FR AOC are dominated by invasive shrubs (e.g., buckthorn, honeysuckle). Needless to say, the overall high ecological quality of the Malchow/Olson Tract is impressive. Therefore, this property should be protected for fish and wildlife habitat in the LGB&FR AOC in order to maintain sustainable fish and wildlife populations.</p>
Significant Invasive Species Issues	<p>Invasive Plant Species: Each of the following species outcompetes and crowds out native plants⁴. Management efforts for invasives at this site are unknown unless otherwise noted.</p> <ul style="list-style-type: none"> • Common reed (<i>Phragmites australis</i>) <ul style="list-style-type: none"> ◦ <i>Phragmites</i> is a common and ongoing problem in the high energy emergent marsh, though recent herbicide sprayings by the WDNR in 2011-2012 and 2015-2016⁴³ have cut back the amount significantly; it is also present along the edges of the shrub carr; continued efforts to control <i>Phragmites</i> is needed. • Hybrid cattail (<i>Typha x glauca</i>) <ul style="list-style-type: none"> ◦ Moderately common in high energy emergent marsh and small inland emergent marsh surrounding the pond in the southwestern corner of the property • Reed canary grass (<i>Phalaris arundinacea</i>)

	<ul style="list-style-type: none"> ○ Common in high energy and small inland emergent marsh, alder-dominated shrub carr, southern sedge meadow, and surrogate grassland (old field); rare in northern hardwood swamp • Glossy buckthorn (<i>Frangula alnus</i>) <ul style="list-style-type: none"> ○ Common in some of the hardwood swamp; rare in northern mesic forest and Great Lakes barrens • European buckthorn (<i>Rhamnus cathartica</i>) <ul style="list-style-type: none"> ○ Rare in hardwood swamp • Creeping-Charlie (<i>Glechoma hederacea</i>) <ul style="list-style-type: none"> ○ Rare in hardwood swamp and northern mesic forest • Purple loosestrife (<i>Lythrum salicaria</i>) <ul style="list-style-type: none"> ○ Rare in alder-dominated shrub carr • Hemp-nettle (<i>Galeopsis tetrahit</i>) <ul style="list-style-type: none"> ○ Rare in northern mesic forest • Showy bush honeysuckle (<i>Lonicera x bella</i>) <ul style="list-style-type: none"> ○ Rare in hardwood swamp • Japanese barberry (<i>Berberis thunbergii</i>) <ul style="list-style-type: none"> ○ Rare in hardwood swamp • Eurasian water-milfoil (<i>Myriophyllum spicatum</i>) <ul style="list-style-type: none"> ○ Present and locally common in submergent marshes throughout • Curly-leaf pondweed (<i>Potamogeton crispus</i>) <ul style="list-style-type: none"> ○ Rare in submergent marsh of unnamed creek <p>Exotic Plant Species:</p> <ul style="list-style-type: none"> • Crack willow (<i>Salix x fragilis</i>), rare in high energy emergent marsh⁴ • Bittersweet nightshade (<i>Solanum dulcamara</i>), rare in high energy emergent marsh and alder-dominated shrub carr⁴ <p>Invasive Animal Species:</p> <ul style="list-style-type: none"> • <i>Birds</i> <ul style="list-style-type: none"> ○ European Starling (<i>Sturnus vulgaris</i>)⁷ <ul style="list-style-type: none"> ▪ Poses some threat to native species, particularly cavity nesters (e.g., Tree Swallow), by outcompeting them and occupying potential nest sites; likely to be found near agricultural fields, housing, and open fields; not currently being managed ○ Brown-headed Cowbird (<i>Molothrus ater</i>)⁷ <ul style="list-style-type: none"> ▪ May pose a small threat to some native species, particularly those birds that nest in edge habitat (i.e., edge or marsh or woodlot); likely to be found near housing and open fields; not currently being managed ○ House Sparrow (<i>Passer domesticus</i>)⁷ <ul style="list-style-type: none"> ▪ May pose a small threat to some native species by outcompeting them for food; likely to be found near housing and open fields; not currently being managed ○ Other exotic bird species are likely occur at the Malchow/Olson Tract, notably Ring-necked Pheasant (<i>Phasianus colchicus</i>) and Rock Pigeon (<i>Columba livia</i>); however, these species generally do not significantly affect native birds because they typically inhabit human areas (e.g., developed or agricultural areas)⁷ ○ Mute Swans (<i>Cygnus olor</i>) are also likely to occur offshore and may pose a small threat to submergent marsh because they are known to eat submerged plants faster than the plants can regrow^{7,10} • <i>Fish</i>: Recorded offshore southeast of the Malchow/Olson Tract in open water in Dead Horse Bay⁹.
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¹⁰ Mute Swan by the Cornell Lab of Ornithology. Available: https://www.allaboutbirds.org/guide/Mute_Swan/lifehistory (accessed on 28 Oct 2016).

	<ul style="list-style-type: none"> ○ Alewife (<i>Alosa pseudoharengus</i>)¹¹ <ul style="list-style-type: none"> ▪ Poses a threat to native fish species by consuming zooplankton and disturbing the natural food web; not currently being managed ○ Common carp (<i>Cyprinus carpio</i>)¹² <ul style="list-style-type: none"> ▪ Destroy vegetation by uprooting plants and increasing cloudiness of water; not currently being managed ○ Rainbow smelt (<i>Osmerus mordax</i>)¹³ <ul style="list-style-type: none"> ▪ Negatively affect uncommon to rare native fish species; not currently being managed ○ Round goby (<i>Neogobius melanostomus</i>)¹⁴ <ul style="list-style-type: none"> ▪ Prey on small native fish and eggs (e.g., darters) and outcompete similarly sized native fish; not currently being managed ○ White perch (<i>Morone americana</i>)¹⁵ <ul style="list-style-type: none"> ▪ Prey on native fish eggs, such as walleye; not currently being managed
Management and Restoration Recommendations	<ul style="list-style-type: none"> ● Continue controlling for invasive plants, such as <i>Phragmites</i>, reed canary grass, and woody plants (e.g., buckthorn) in all major habitats as needed. ● Investigate reintroducing wild rice (<i>Zizania</i> spp.) near the mouth of the small stream on the south side of the property where it was known to occur in 1840 (see “Site History” below). ● Develop or restore important fish spawning and nursery habitats, such as rocky reefs, gravel, cobble, woody debris, and sandy areas for shoreline fish. ● Continue efforts to maintain northern pike passage along migratory corridors on the southern side of this priority area and the restored wetland for spawning. ● Expand existing southern sedge meadow. ● Along and within the stream, improve substrate (including gravel, riffles, and pool habitat) and protect/enhance riparian habitats. ● Designate and protect sensitive areas and investigate establishing a conservation easement. ● Protect, maintain, and expand submergent marsh biodiversity hotspots. ● Conduct inventory for remnant freshwater mussel beds and translocate/reintroduce populations at favorable locations. Use published studies (e.g., Morales et al. 2006) to identify optimal sites for re-introduction. ● Conduct baseline studies on wildlife that have not been adequately sampled here: aquatic invertebrates (e.g., dragonflies, mayflies), reptiles, and mammals.
Reference Links and Documents	Links: <ul style="list-style-type: none"> ● Fox 11 new story on the northern pike restoration project. Available: http://fox11online.com/news/local/newborn-northern-pike-head-for-home.

¹¹ Fuller, P., E. Maynard, D. Raikow, J. Larson, A. Fusaro, and M. Neilson. 2016. *Alosa pseudoharengus*. USGS Nonindigenous Aquatic Species Database, Gainesville, FL. <https://nas.er.usgs.gov/queries/factsheet.aspx?SpeciesID=490> Revision Date: 9/25/2015. Accessed 17 Oct 2016.

¹² Nico, L., E. Maynard, P.J. Schofield, M. Cannister, J. Larson, A. Fusaro, and M. Neilson. 2016. *Cyprinus carpio*. USGS Nonindigenous Aquatic Species Database, Gainesville, FL. <https://nas.er.usgs.gov/queries/FactSheet.aspx?SpeciesID=4> Revision Date: 7/15/2015. Accessed 17 Oct 2016.

¹³ Fuller, P., E. Maynard, J. Larson, A. Fusaro, T.H. Makled, and M. Neilson. 2016. *Osmerus mordax*. USGS Nonindigenous Aquatic Species Database, Gainesville, FL. <https://nas.er.usgs.gov/queries/FactSheet.aspx?SpeciesID=796> Revision Date: 9/29/2015. Accessed on 17 Oct 2016.

¹⁴ Fuller, P., A. Benson, E. Maynard, M. Neilson, J. Larson, and A. Fusaro. 2016. *Neogobius melanostomus*. USGS Nonindigenous Aquatic Species Database, Gainesville, FL. <https://nas.er.usgs.gov/queries/FactSheet.aspx?SpeciesID=713> Revision Date: 1/7/2016. Accessed on 17 Oct 2016.

¹⁵ Fuller, P., E. Maynard, D. Raikow, J. Larson, A. Fusaro, and M. Neilson. 2016. *Morone americana*. USGS Nonindigenous Aquatic Species Database, Gainesville, FL. <https://nas.er.usgs.gov/queries/FactSheet.aspx?SpeciesID=777> Revision Date: 1/15/2016. Accessed on 17 Oct 2016.

	<p>Reference Documents:</p> <ul style="list-style-type: none"> • Dorney, J.R. 1975 The vegetation pattern around Green Bay in the 1840s as related to geology, soils, and land use by Indians with a detailed look at the Townships of Scott, Green Bay, and Suamico. Book available through the UW-Green Bay Cofrin Library Archives and Area Research Center. • Wisconsin Department of Natural Resources. 1979. Green Bay West Shores Master Plan Concept Element. Property Task Force: F. Roznik, J. Raber, D. Olson, L. Linteur, and L. Kernen.
<p>Site History (e.g., original vegetation, past conservation projects)</p>	<p>In the early 1630s, Frenchman Jean Nicolet first arrived in lower Green Bay when it was primarily inhabited by Native American tribes¹⁶. Lower Green Bay consisted of large beds of wild rice (<i>Zizania</i> sp.) and wild celery (<i>Vallisneria americana</i>), extensive emergent marsh (<i>Schoenoplectus</i> sp., cattail), sedge meadows (<i>Calamagrostis canadensis</i>), shrub carr (e.g., <i>Cornus</i> spp., <i>Salix</i> spp.), swamps, and wet conifer forest (black spruce [<i>Picea mariana</i>], balsam fir [<i>Abies balsamea</i>])^{17,18,19,20,21,22}. Between the late 1600s and 1800s, European fur trade, duck hunting, fishing, logging, shipping, and agriculture were important early industries in lower Green Bay^{23,24,25}. In the early 1800s, there were a few small settlements and farms of Europeans and Native Americans in the lower Bay²⁴. Menominee people were likely the predominant Native American tribe residing in the Village of Suamico prior to and during European settlement²⁷.</p> <p>In late August and September 1840, surveyors of the Wisconsin Public Land Survey System (PLSS) noted that along the coastal area of the Malchow/Olson Tract there was a shallow marsh consisting of wild rice and rushes (<i>Juncus</i> spp.) that was located near the mouth of the small stream on the south side of the property (stream is still present today and connects to the ponds at Barkhausen Waterfowl Preserve) as well as a tamarack (<i>Larix laricina</i>) swamp²⁶. Further inland about a half kilometer, there were oak (recorded as "S. oak," which is likely swamp white oak) and aspen (<i>Populus tremuloides</i>) forests²⁶. Similarly, Dorney (1975) reported that most of this property consisted of tamarack (<i>Larix laricina</i>), black ash (<i>Fraxinus nigra</i>), and alder (<i>Alnus incana</i>) as well as marsh (called "swamp" in Dorney 1975)²⁷. The Malchow/Olson Tract is currently located in what is today called the Village of Suamico. Suamico was founded in August 1848, and the primary source of income for residents was from farming or working at large sawmills in the 1850s and 1860s²⁸.</p>

¹⁶ Jean Nicolet: French Explorer. By The Editors of Encyclopaedia Britannica. Available: <https://www.britannica.com/biography/Jean-Nicolet> (accessed on 24 Oct 2016).

¹⁷ Arthur C. Neville's Map of Historic Sites on Green Bay, Wisconsin 1669-1689. Available: <http://s3.amazonaws.com/labaye/data/Bay%20Settlement%20Map%20W%20Historical%20Bulletin%201926.pdf> (accessed on 24 Oct 2016).

¹⁸ Survey of the N.W. Lakes: East Shore of Green Bay 1843. Available: <http://s3.amazonaws.com/labaye/data/1843%20East%20Shore%20of%20Green%20Bay.jpg> (accessed on 24 Oct 2016).

¹⁹ 1845 Chart of Green Bay. Available: <http://s3.amazonaws.com/labaye/data/1845%20Chart%20of%20Green%20Bay.pdf> (accessed on 24 Oct 2016).

²⁰ 1820s Fox River Military Road Map to Ft. Crawford. Available: <http://s3.amazonaws.com/labaye/data/1820s%20Fox%20River%20Military%20Road%20Map%20to%20Ft.%20Crawford.pdf> (accessed on 24 Oct 2016).

²¹ UW-Green Bay personal communication with Thomas Erdman.

²² 1845 Map of western lower Green Bay. Available: <http://browncounty.maps.arcgis.com/apps/StorytellingSwipe/index.html?appid=72615351ef33434e9a6a1bb5ffdb9c&webmap=02074b6abfc44b88bfe9e96afe90a014> (accessed on 28 Oct 2016).

²³ City of Green Bay's History Webpage: <http://www.ci.green-bay.wi.us/history/1800s.html> (accessed on 20 Oct 2016).

²⁴ Excerpt from "Recollections of Green Bay in 1816-17" by James W. Biddle. Available: <http://s3.amazonaws.com/labaye/data/Recollections%20of%20Green%20Bay%20in%201816-1817.pdf> (accessed on 24 Oct 2016).

²⁵ The Early Outposts of Wisconsin: Green Bay for Two-Hundred Years, 1639-1839. Available: <http://labaye.org/item/70/2810> (accessed on 25 Oct 2016).

²⁶ Wisconsin Public Land Survey System (1834) from file "PLSS_SurveyData.shp"

²⁷ The vegetation pattern around Green Bay in the 1840s as related to geology, soils, and land use by Indians with a detailed look at the Townships of Scott, Green Bay, and Suamico by John Dorney, 1975. File "Dorney1975_VegetationPatternGreenBay1840s.pdf".

²⁸ Suamico Information and Photos from the Howard-Suamico Historical Society. Available: <http://www.hshistoricalsociety.org/Suamico.html> (accessed on 26 Oct 2016).

Throughout the 1800s and early 1900s, European immigrants sailed across the Atlantic Ocean to reach the United States in order to escape difficult economic and social times of Europe²⁹. Immigrants arriving in the state of Wisconsin were largely German though others included Irish, Norwegian, Dutch, and Canadian²⁹. Dating back to 1875, the Malchow/Olson Tract was privately owned by U. H. Peak³⁰, and in 1889, it was owned by A. McDonald³¹. Sometime in the (estimated) 1890s, the Malchow family (likely the parents of the now deceased children, William and Gordon Malchow) immigrated from Germany and settled on the priority area currently known as “Malchow/Olson Tract”³². They owned most of this land and used it primarily for farming as did many Suamico residents³². The original Malchow’s had two sons, William Malchow (born c1899) and Gordon Malchow (born 1901)^{33,34}. Gordon Malchow married Ethel Malchow (maiden name unknown; born c1912), and they had eleven children (including Edmund [born 1925], Vernon [born c1936], Eileen Malchow [born c1937], and others)^{32,33}. In the 1935 Plat book, it was documented that William Malchow owned the same property described here on the Malchow/Olson Tract³⁵. Eileen Malchow married Gordon (“Gordy”) Olson, and they had three children [Jan, Bert, and Julie Malchow]³⁶. Many of Gordon and Ethel Malchow’s children (including Eileen Olson [formerly Malchow]) and extended family still own and live on their family’s land today³². Before Gordon and Ethel Malchow died, their one wish was for their children to preserve this family property for the purposes of wildlife preservation rather than selling the land for development³². Thanks to Eileen and her siblings’ perseverance in honoring their parent’s wishes, most of this ecologically important tract of land is largely untouched. It is relatively intact and contains significant, high quality fish and wildlife habitat that is critical to the LGB&FR AOC. In fact, the high energy emergent marsh and hardwood forest represent the best and highest quality habitats in the entire LGB&FR AOC.

In the late 1970s, the WDNR published a master plan, in which they delineated habitat types for west shore wildlife areas, including the Malchow/Olson Tract even though it is privately owned³⁷. Interestingly, the habitat types from the 1970s look very similar to what UW-Green Bay found in 2015-16 when they conducted a habitat mapping across the LGB&FR AOC (2015) and detailed vegetation surveys (2016)^{3,4,37}. In the 1970s, the Malchow/Olson Tract consisted of a band of “emergent vegetation” along the shoreline with plants like cattail, bulrush, and tall sedges³⁷. The next band of habitat further inland was “lowland brush willow,” which contained at least 50% willow³⁷. In the northwestern corner of the property was “northern hardwoods” with sugar maple (*Acer saccharum*), basswood (*Tilia americana*), yellow birch (*Betula alleghaniensis*), and elm (*Ulmus americana*)³⁷. Along most of the western edge of the property was swamp hardwood forest with black ash, American elm, black willow (*Salix nigra*), and some cottonwood (*Populus deltoides*)³⁷. There were also small grassy openings in the southwestern corner and southern third of the property and an oak-dominated wooded area in the southwestern corner³⁷. Based on a 1970 survey by George Howlett, there was also a submergent marsh with coon’s tail (*Ceratophyllum demersum*), sago pondweed (*Stuckenia pectinata*), and common duckweed (*Lemna minor*) as dominants³⁸. Other important natives found there included: blue-joint grass, greater straw sedge (*Carex normalis*), woollyfruit sedge (*Carex lasiocarpa*), flat sedge

²⁹ 19th Century Immigration by the Wisconsin Historical Society. Available: http://www.wisconsinhistory.org/turningpoints/tp-018/?action=more_essay (accessed on 25 Oct 2016).

³⁰ 1875 Brown County plat map. Available through the UW-Green Bay Cofrin Library Archives and Area Research Center.

³¹ 1889 Brown County plat map. Available through the UW-Green Bay Cofrin Library Archives and Area Research Center.

³² UW-Green Bay personal communication with Eileen Olson (formerly Malchow).

³³ Ancestry.com Records on Gordon Malchow from the 1940 Census. Available: http://www.ancestry.com/1940-census/usa/Wisconsin/Gordon-Malchow_2znsg1 (accessed on 25 Oct 2016).

³⁴ People Search on Malchow. Available: <http://www.locateancestors.com/malchow-wisconsin/> (accessed on 25 Oct 2016).

³⁵ 1935 Plat Book of Suamico, WI: http://www.gis.co.brown.wi.us/web_documents/LIO/HistoricMaps/PorathPlatBook1934-1936/Town%20of%20Suamico%20Jan%201935.pdf.

³⁶ Gordon L. Olson’s Obituary. Available: <http://www.lyndahl.com/obituary/73513/Gordon-L-%22Gordy%22-Olson/> (accessed on 25 Oct 2016).

³⁷ Green Bay West Shores Master Plan Concept Element 1979 by Roznik et al.

³⁸ Howlett, Jr. 1974: The rooted vegetation of west Green Bay with reference to environmental change

(*Cyperus odoratus*), bald spike-rush (*Eleocharis calva*), boneset (*Eupatorium perfoliatum*), common rush (*Juncus effusus*), and curly-top knotweed (*Persicaria lapathifolia*)³⁸.

Some of the property has agricultural fields and small housing areas that have likely been there for >100 years (anthropogenic land use visible in 1938 air photo)³⁹. Based on a site visit in July 2016, it also appears that some of the northern mesic forest on the northcentral part of the property was cut sometime in the past ten years since there are many old tree stumps⁴. Otherwise, the Malchow/Olson Tract has been relatively unaffected by disturbance and management through the years. However, it should be noted that the Wisconsin Department of Natural Resources (WDNR) recently launched two major herbicide sprayings of *Phragmites* along the west shore⁴³. One of the many sites included in this effort was the Malchow/Olson Tract. In 2011 and 2012, the WDNR conducted an aerial herbicide spraying along the entire coastal area of the Malchow/Olson Tract (or approximately one third of the total area of the tract) in 2011 and 2012. Then, they did a small, follow-up ground treatment of approximately 11 ha of the coastal area as well as a small inland wetland in 2015 and 2016. These management efforts were huge successes on this property because the amount of *Phragmites* present today has been significantly reduced.

Since 2013, Brown County's Land and Water Conservation Department has led a northern pike habitat restoration project along the west shore (including the Malchow/Olson Tract), in which the goal of the project was to establish riparian buffers, remove stream impediments to fish migration, and restore wetland areas along intermittent and perennial streams⁴⁰. Northern pike are known to migrate along roadside ditches, such as Lineville Road (southern boundary of Malchow/Olson Tract in Suamico, WI), to their inland spawning grounds⁴⁰. Pike spawn in the small restored wetland on the Malchow/Olson Tract in the spring, and then both the adults and young-of-the-year emigrate back to the Bay of Green Bay⁴⁰. The Brown County Land and Water Conservation Department, WDNR, and UW-Green Bay have conducted northern pike studies on the Malchow/Olson Tract and elsewhere across the west shore of the Bay; some studies date back to 1996⁴⁰.

Eileen and her family have been instrumental, welcoming, and kind in helping local conservation efforts that have taken place on their family's property over the years. Local efforts conducted on their property include those organized by: University of Wisconsin-Green Bay's Cofrin Center for Biodiversity (information provided by Eileen in this narrative; granting permission to survey birds and frogs in 2014, habitats in 2015, and plants in 2016 [including collecting plant specimens from their property for herbarium archives]), Brown County's Land and Water Conservation Department (northern pike west shore restoration project over the past several years have taken place on the Malchow/Olson property and other local land owners^{41,42}), and Wisconsin Department of Natural Resources (aerial herbicide treatment of *Phragmites* in 2011-2012 and on the ground in 2015-2016 on the Malchow property and others⁴³). **These organizations and agencies extend their sincere gratitude and appreciation to the Malchow family.**

³⁹ Brown County's Multi-purpose GIS map and 1938 aerial photograph. Available:

http://www.co.brown.wi.us/departments/page_7f0c2fbc6bc6/?department=85713eda4cdc&subdepartment=89ce08984445 (accessed on 2 Nov 2016).

⁴⁰ LGB&FR AOC Comprehensive Conservation Project Catalogue

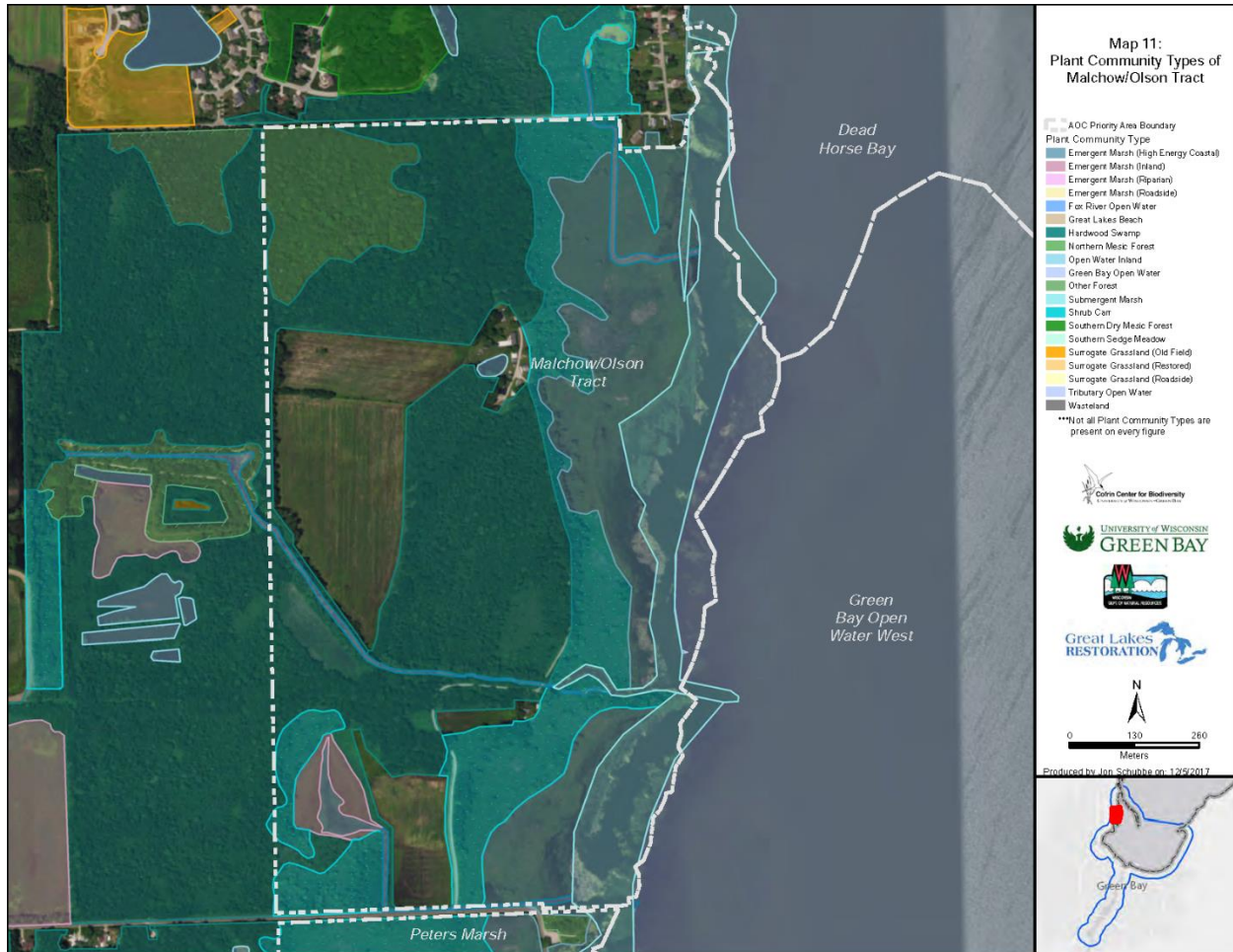
⁴¹ Fox 11 new story on the northern pike restoration project. Available: <http://fox11online.com/news/local/newborn-northern-pike-head-for-home> (accessed on 25 Oct 2016).

⁴² Brown County West Shore Northern Pike Habitat Project:

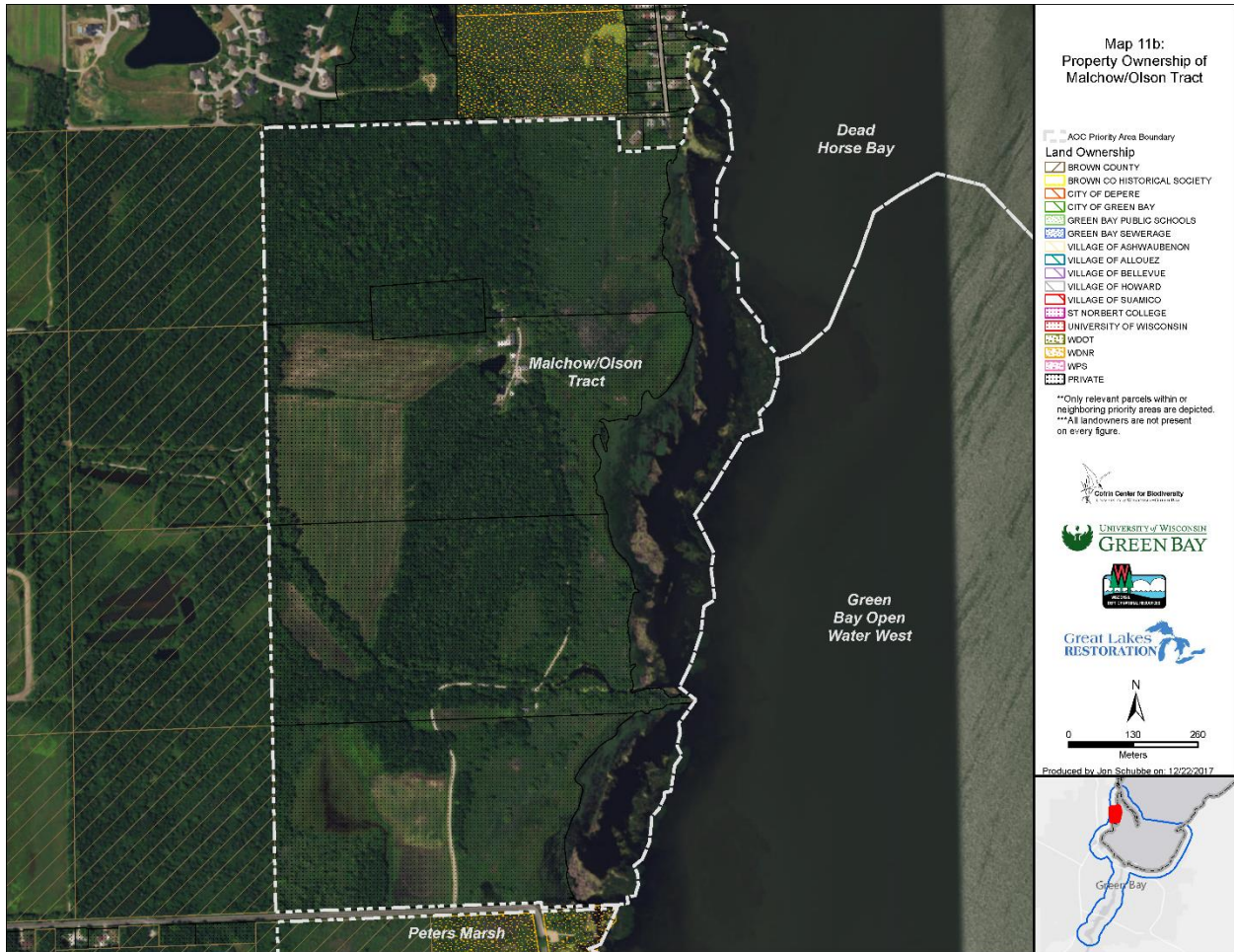
http://www.co.brown.wi.us/departments/page_f2f42ba8553c/?department=097_c0e79486a&subdepartment=7c17181709a3 (accessed on 25 Oct 2016).

⁴³ WI Dept. of Natural Resources' *Phragmites* Treatment 2011-12 and 2015-16. Files "GLFWRA_Phrag2015_16_aoc.shp" and "Aerial_2011_12.shp".

Map of the Malchow/Olson Tract's plant communities, which are delineated based on the UW-Green Bay 2015 habitat mapping effort and 2017 submerged aquatic vegetation surveys. Map made by UW-Green Bay's Jon Schubbe.



Land ownership boundaries of the Malchow/Olson Tract. Map made by UW-Green Bay's Jon Schubbe.



Photograph of the Malchow/Olson Tract facing directly west. Photograph taken by Erin Giese on 2 December 2016.

