

REGIONAL AND PROPERTY ANALYSIS:

GREEN BAY PLANNING GROUP



Wildlife Area:

- Green Bay West Shores
 - Charles Pond Unit
 - Little Tail Unit
 - Long Tail Unit
 - Oconto Marsh Unit
 - Peats Lake Unit
 - Pecor Point Unit
 - Pensaukee Unit
 - Peshtigo Harbor Unit
 - Rush Point Unit
 - Sensiba Unit
 - Tibbett-Suamico Unit

State Natural Areas:

- Bloch Oxbow
- Charles Pond
- Peshtigo Harbor Lacustrine Forest
- Peshtigo River Delta Marshes



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Cover Image: Peshtigo wetland
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LIST OF ACRONYMS

ADA	Americans with Disabilities Act
CNNF	Chequamegon-Nicolet National Forest
COA	Conservation Opportunity Area
CTH	County Highway
DBH	Diameter at Breast Height
DOT	Department of Transportation
EAB	Emerald Ash Borer
EL	Ecological Landscape
GBPG	Green Bay Planning Group
GBWS	Green Bay West Shore
GLRI	Great Lakes Restoration Initiative
HCVF	High Conservation Value Forest
RPA	Regional and Property Analysis
SCORP	Statewide Comprehensive Outdoor Recreation Plan
SGCN	Species of Greatest Conservation Need
SNA	State Natural Area
WA	Wildlife Area
WDNR	Wisconsin Department of Natural Resources
WisFIRS	Wisconsin Forest Inventory and Reporting System

INTRODUCTION AND OVERVIEW

PURPOSE OF A REGIONAL AND PROPERTY ANALYSIS

A Regional and Property Analysis (RPA) is required by Chapter NR 44, Wisconsin Administrative Code, when developing a Master Plan, plan revision, or plan amendment. The RPA forms the foundation of the master plan, providing the baseline information on the property or property group as well as information on how each property fits into or relates to its larger ecological and social context. Functionally, it identifies the most suitable potential future roles or niches for the properties and highlights those elements of the regional context that are most important to consider when planning the properties.

The **Regional Analysis** component of this document describes the broader biological/ecological, cultural, economic, and recreational environments that affect the Green Bay Planning Group properties and their uses. It identifies significant ecological and recreational needs within the planning group's region. It also defines existing and potential social demands or constraints affecting the properties that should be considered during the planning process.

The **Property Analysis** component of this document describes the properties' existing resources, uses, management opportunities, limitations, and needs. This section also describes surrounding and adjacent lands, indicating how the character of these lands may affect the properties or their uses.

The **Findings and Conclusions** component is the most important section of the RPA. Based on all the regional and property data in the body of the document, the Findings and Conclusions section outlines the best probable future role or niche for the properties. It helps focus the planning process and becomes the foundation for building the master plan's vision and goals, and action strategies.

INTRODUCTION TO THE PROPERTIES

OVERVIEW OF THE GREEN BAY PLANNING GROUP

The Green Bay Planning Group (GBPG; also referred to as "the plan area") includes 12 named properties located along the west shore of Green Bay in Brown, Marinette, and Oconto counties (Map A). The Green Bay West Shore Wildlife Area contains 11 separate, non-contiguous units scattered along the west shore (Map B). Three of these units have embedded State Natural Areas (SNAs). A stand-alone SNA, Bloch Oxbow, comprises the twelfth named property. There also is a 757-acre gift lands parcel (known as the Badger Gift Lands) in Marinette County, and several other scattered parcels. These properties total 10,654 acres of state protected and managed land: 8,875.5 acres of WA (which includes 1,073.5 acres of embedded SNA); 597.5 acres of stand-alone SNA; 757 acres of Gift Lands; 298.5 acres of Scattered Fishery Habitat and Statewide Wildlife Habitat parcels; and 125.5 acres of transferred DOT wetland mitigation. Property acreages are given in Table 1.

Table 1. Green Bay Planning Group Property Acreages.

Property	Acreage*	Embedded SNA	Acreage*
Green Bay West Shore Wildlife Area			
Charles Pond Unit	152.5	Charles Pond	152.5
Little Tail Unit	243		
Long Tail Unit	317		
Oconto Marsh Unit	927		
Peats Lake Unit	491		
Pecor Point Unit	89		
Pensaukee Unit	515		
Peshtigo Harbor Unit	4,812	<ul style="list-style-type: none"> • Peshtigo Harbor Lacustrine Forest • Peshtigo River Delta Marshes 	<ul style="list-style-type: none"> • 440 • 481
Rush Point Unit	384		
Sensiba Unit	637		
Tibbett-Suamico Unit	308		
Stand-alone State Natural Area			
Bloch Oxbow	597.5		
Gift Lands			
Badger Gift Lands	757		
Other State-owned Lands			
Brown County	219		
Marinette County	80		
Oconto County	125		

*Property acreages are extracted from the DNR Managed Lands GIS spatial database and may differ from the acreages represented in property deed legal descriptions. Acreage totals do not include ~21 acres of scattered access easements located outside of existing project boundaries. Property acreages also may change depending on water level fluctuations in Green Bay.

The scope of use and management of a state property is governed by its official designation.

WILDLIFE AREAS

Wildlife Areas (WAs) are acquired and managed under the authority of Section 23.09(2)(d)3, Wisconsin Statutes, and Chapter NR 1.51, Wisconsin Administrative Code. They are designated to provide places where people can hunt, trap, and fish. WAs also are open for traditional outdoor uses of walking, skiing, snow shoeing, nature study, berry picking, and other low-impact recreational activities. As directed by NR 1.51 and NR 1.61, other recreational uses may be allowed on WAs by the Master Plan if those uses do not detract from the primary purpose of these properties.

STATE NATURAL AREAS

State Natural Areas (SNAs) are defined and authorized in Sections 23.27-23.29, Wisconsin Statutes and Chapter NR 1.32, Wisconsin Administrative Code as “an area of

land or water which has educational or scientific value or is important as a reservoir of the state's genetic or biological diversity and includes any buffer area necessary to protect the area's natural value". Section 23.27(1) defines natural areas as "reserves for native biotic communities...habitat[s] for endangered, threatened, or critical species...or areas with highly significant geological or archaeological features". Section 23.28(1) provides authority to designate areas as SNAs and Section 23.29 provides authority to legally dedicate and protect SNAs in perpetuity. While the intent of the SNA program is to preserve the best examples of the state's diverse natural communities, other recreational uses may be allowed if they do not threaten the site's natural values.

BADGER GIFT LANDS

A 757-acre parcel adjacent to and north of the Peshtigo Harbor Unit of the Green Bay West Shore WA is part of lands that were gifted to the Department as part of a 2002 consent decree with the Fort James Operating Company (now Georgia Pacific). This decree was part of the Natural Resources Damage Assessment for the Fox River. This parcel is now known as the Badger Gift Lands (named for Badger Paper Mills, Inc., who formerly owned the land).

OTHER STATE-OWNED LANDS

The GBPG also includes eight parcels scattered throughout the plan area that were acquired under the authority of the Scattered Fishery Habitat Program and the Statewide Wildlife Habitat Program, two statewide programs that permit purchase of small-acreage sites outside of existing property project boundaries. These parcels are acquired to protect important fish and wildlife habitat. There also are 125.5 acres of former DOT wetland mitigation, transferred to the Department in 2011, that fall outside existing project boundaries. These nine parcels comprise 424 acres.

ANALYSIS OF THE REGIONAL CONTEXT

This analysis describes the regional context of the GBPG using three main elements. The **Biological Resources and Ecological Capability** section highlights significant physical, biological, and ecological features such as soils, water resources, vegetation, and rare habitats and species that help frame the region’s land management opportunities, priorities, and considerations. The **Land Use and Socio-economic Characteristics** section describes the region’s human population, land use, and economic issues, and the **Recreation Resources, Use, and Demand** section provides an overview of the outdoor recreational activities and use patterns that characterize the region.

BIOLOGICAL RESOURCES AND ECOLOGICAL CAPABILITY

DEFINING THE REGION

The ecological characteristics of the GBPG will be described using the framework of Ecological Landscapes. Ecological Landscapes (ELs) are regions of the state that have distinct ecological characteristics and management opportunities. The Wisconsin Department of Natural Resources (WDNR) has divided the state into 16 ELs, which are based on subsections of a national system of ecoregions called the National Hierarchical Framework of Ecological Units (NHFEU). Most of the GBPG falls within the Northern Lake Michigan Coastal EL, with the four southernmost properties falling within the Central Lake Michigan Coastal EL (Figure 1). These two Landscapes comprise the “region” for the purposes of this analysis. The following two sections are based on descriptions of these two ELs from the *Ecological Landscapes of Wisconsin Handbook* (WDNR *in prep*). Consult this document for additional detail.

Figure 1. Ecological Landscapes of Wisconsin. The star shows the approximate location of the GBPG.



NORTHERN LAKE MICHIGAN COASTAL ECOLOGICAL LANDSCAPE

All but the four southernmost units of the Green Bay West Shore WA are located in the Northern Lake Michigan Coastal EL, which encompasses almost the entire west shore of Green Bay as well as the Door Peninsula and includes over 200 miles of coastline. Major landforms of this EL include the Niagara Escarpment, a dolomite bedrock outcrop that runs along the east side of Green Bay, a lacustrine plain on the west side of Green Bay, and

ground moraine. Sand dunes, beaches, and ridge-and-swale topography are found along the Lake Michigan shore.

Historic vegetation within this EL was forest-dominated. Beech-maple-basswood and hemlock-hardwood forests were found in the uplands, while lowland areas hosted white cedar and hardwood-conifer swamps. In the cool, moist climatic zones close to Lake Michigan, boreal-like upland forests were present which contained significant amounts of white spruce, balsam fir, and other conifers. There were also extensive sedge meadows and coastal marshes. Today, over 64% of this EL is non-forested, largely agricultural with smaller amounts of grassland, wetland, shrubland, and urban areas. Forested areas are dominated by maple-basswood in the uplands, with smaller amounts of aspen-birch, and forested wetlands are mostly lowland hardwoods.

CENTRAL LAKE MICHIGAN COASTAL ECOLOGICAL LANDSCAPE

The four southernmost units—Little Tail, Sensiba, Long Tail, and Peats Lake—of the Green Bay West Shore WA fall within the Central Lake Michigan Coastal EL. This EL is located in east-central Wisconsin and extends from southern Door County west across Green Bay to the Wolf River basin, then south in a narrowing band along the Lake Michigan shoreline to central Milwaukee County. It is characterized by shales and dolomites overlain with glacial deposits. The principal bedrock feature is the dolomite Niagara Escarpment which runs northeast to southwest across the entire EL. The primary glacial landforms are ground moraine, outwash, and lakeplain. Other landforms such as sandspits, clay bluffs, beach and dune complexes, and ridge-and-swale systems are associated only with the shorelines of Green Bay and Lake Michigan. This EL contains 60 miles of Green Bay shoreline and 115 miles of Lake Michigan shoreline.

Historically, the majority of this EL was vegetated with mesic maple-basswood-beech forests. Poorly-drained glacial lakeplain areas hosted wet forests of tamarack, white cedar, black ash, red maple, and elm, while emergent marshes and sedge meadows occurred in and around lower Green Bay. The Lake Michigan shoreline supported beaches and dunes, intertidal wetlands, marshes, and diverse ridge-and-swale vegetation. Most of the mesic upland forest has given way to agriculture and residential and industrial development, and this EL is now 84% non-forested. Large areas of wetland in lower Green Bay have been filled in for urban development. Significant wetlands remain, but most have been affected to various degrees by disrupted hydrology, pollution, sedimentation, and invasive exotic species. Fragmentation is severe throughout this EL, particularly in upland habitats, and invasive species are problematic in both terrestrial and aquatic habitats.

REGIONAL BIODIVERSITY NEEDS AND OPPORTUNITIES

Natural Communities

The Wisconsin Wildlife Action Plan (WDNR 2006a) identified management opportunities for natural communities by EL, as the different ELs present varying

opportunities to sustain the state’s native natural communities. The goal of sustaining natural communities consists of managing for natural community types that 1) historically occurred in a given EL and 2) have a high potential to maintain their characteristic composition, structure, and ecological function over a long period of time (e.g., 100 years). This can help guide land and water management activities so that they are compatible with the local ecology of a given EL while maintaining important components of ecological diversity and function.

The Northern Lake Michigan Coastal EL presents opportunity to manage for 40 natural community types. Of these, 14 are considered “major” opportunities and 19 are considered “important”.

The Central Lake Michigan Coastal EL offers opportunity to manage for 37 natural communities, of which 8 are considered “major” opportunities and 20 are considered “important”.

Of all of these major and important natural community opportunities, the GBPG presents opportunity to manage for 9 from the Northern Lake Michigan Coastal EL and 6 from the Central Lake Michigan Coastal EL. These are shown in Table 2.

A “major” opportunity indicates that a natural community can be sustained in an Ecological Landscape, either because many significant occurrences of the natural community have been recorded in the landscape or because major restoration activities are likely to be successful in maintaining the community’s composition, structure, and ecological function over a longer period of time.

An “important” opportunity indicates that although the natural community does not occur extensively or commonly in the Ecological Landscape, one to several occurrences do occur and are important in sustaining that community in the state. In some cases, important opportunities may exist because the natural community may be restricted to just one or a few Ecological Landscapes within the state and there may be a lack of opportunities elsewhere.

Table 2. Natural Community Management Opportunities of the GBPG by Ecological Landscape.

Major	Important
Northern Lake Michigan Coastal	
Emergent Marsh	Floodplain Forest
Northern Mesic Forest	Northern Dry-mesic Forest
Northern Sedge Meadow	Southern Sedge Meadow
Northern Wet-mesic Forest	
Warmwater Rivers	
Warmwater Streams	
Central Lake Michigan Coastal	
Great Lakes Beach	Emergent Marsh
Warmwater Rivers	Shrub-Carr
Warmwater Streams	Southern Sedge Meadow

Species of Greatest Conservation Need

The Wisconsin Wildlife Action Plan (WDNR 2006a) also identified Species of Greatest Conservation Need (SGCN), including birds, fish, mammals, herptiles, and invertebrates. SGCN are species in need of conservation action because they are:

ANALYSIS OF THE REGIONAL CONTEXT

- already listed as endangered or threatened;
- at risk because of threats to their life history needs or habitats;
- declining in adjacent states or nationally, though stable in Wisconsin;
- of unknown status in Wisconsin and suspected to be vulnerable.

The Wildlife Action Plan Ecological Priorities Tool (WDNR 2006b) generates a list of vertebrate SGCN of highest priority for a given combination of natural community and Ecological Landscape. This prioritization is based on: the probability that a species will occur in a given Landscape; the degree to which a species is associated with a particular natural community; and the degree to which an EL presents opportunities to sustain a particular natural community. Table 3 lists the high-priority vertebrate SGCN for the 11 communities that have significant management opportunity in the GBPG, according to these natural community-EL associations for the 2 ELs of the plan area. This is not a complete list of SGCN for the GBPG, but represents those species for which the plan area offers the greatest actual or potential management opportunity.

Table 3. Natural Community Associations for High-Priority Vertebrate SGCN in the GBPG by Ecological Landscape. An ‘x’ indicates that a species is either significantly or moderately associated with a natural community for that EL. Species in **bold** have been documented on the GBPG.

Species of Greatest Conservation Need	Emergent Marsh	Floodplain Forest	Great Lakes Beach	Northern Dry-mesic Forest	Northern Mesic Forest	Northern Sedge Meadow	Northern Wet-mesic Forest	Shrub-Carr	Southern Sedge Meadow	Warmwater Rivers	Warmwater Streams
Northern Lake Michigan Coastal											
Birds (39)											
American Bittern	x					x			x		
American Golden-Plover	x										
American Woodcock					x						
Bald Eagle										x	
Black Tern	x					x					
Black-billed Cuckoo		x			x						
Black-throated Blue Warbler				x	x						
Blue-winged Teal	x	x				x			x		
Blue-winged Warbler		x									
Bobolink						x			x		
Buff-breasted Sandpiper	x										
Canada Warbler				x	x		x				
Canvasback										x	
Common Tern	x										
Dunlin	x									x	
Eastern Meadowlark									x		
Forster's Tern	x										
Golden-winged Warbler				x	x						

ANALYSIS OF THE REGIONAL CONTEXT

Species of Greatest Conservation Need	Emergent Marsh	Floodplain Forest	Great Lakes Beach	Northern Dry-mesic Forest	Northern Mesic Forest	Northern Sedge Meadow	Northern Wet-mesic Forest	Shrub-Carr	Southern Sedge Meadow	Warmwater Rivers	Warmwater Streams
Great Egret	x	x								x	
Hudsonian Godwit	x										
Least Flycatcher		x		x	x						
Marbled Godwit	x										
Northern Goshawk				x	x						
Northern Harrier						x			x		
Olive-sided Flycatcher							x				
Osprey										x	
Red-headed Woodpecker		x									
Red-shouldered Hawk		x		x	x						
Rusty Blackbird	x	x									
Short-billed Dowitcher	x										
Snowy Egret	x										
Solitary Sandpiper	x	x									x
Veery		x		x	x						
Whimbrel	x										
Whip-poor-will				x							
Willow Flycatcher									x		
Wood Thrush		x			x						
Yellow Rail						x					
Yellow-billed Cuckoo		x									
Fish (6)											
Greater Redhorse										x	x
Lake Sturgeon										x	
Longear Sunfish										x	x
Redfin Shiner										x	
Shoal Chub (Speckled Chub)										x	
Western Sand Darter										x	
Herptiles (6)											
Blanding's Turtle	x	x				x			x	x	x
Four-toed Salamander	x	x			x	x	x		x		
Mink Frog	x					x				x	x
Mudpuppy										x	
Pickerel Frog	x	x			x	x	x		x	x	x
Wood Turtle		x			x	x	x		x	x	x
Mammals (8)											
Eastern Red Bat	x	x		x	x	x	x		x	x	x
Gray Wolf		x		x	x		x				
Hoary Bat	x	x		x	x	x	x		x	x	x
Northern Flying Squirrel		x		x	x		x				
Northern Long-eared Bat	x	x		x	x	x			x	x	x
Silver-haired Bat	x	x		x	x	x	x		x	x	x
Water Shrew		x			x		x				x
Woodland Jumping Mouse		x			x		x				

ANALYSIS OF THE REGIONAL CONTEXT

Species of Greatest Conservation Need	Emergent Marsh	Floodplain Forest	Great Lakes Beach	Northern Dry-mesic Forest	Northern Mesic Forest	Northern Sedge Meadow	Northern Wet-mesic Forest	Shrub-Carr	Southern Sedge Meadow	Warmwater Rivers	Warmwater Streams
Central Lake Michigan Coastal											
Birds (35)											
American Bittern	x								x		
American Golden-Plover	x										
American Woodcock								x			
Bald Eagle										x	
Black Tern	x										
Black-billed Cuckoo								x			
Blue-winged Teal	x								x		
Blue-winged Warbler								x			
Buff-breasted Sandpiper	x										
Canvasback										x	
Caspian Tern			x								
Common Tern	x		x								
Dunlin	x		x							x	
Eastern Meadowlark									x		
Forster's Tern	x										
Golden-winged Warbler								x			
Great Egret	x									x	
Hudsonian Godwit	x										
King Rail	x								x		
Lesser Scaup										x	
Marbled Godwit	x										
Northern Harrier									x		
Osprey										x	
Piping Plover			x								
Rusty Blackbird	x							x			
Short-billed Dowitcher	x										
Short-eared Owl								x	x		
Snowy Egret	x										
Solitary Sandpiper	x										x
Veery								x			
Whimbrel	x		x								
Willow Flycatcher								x	x		
Wilson's Phalarope	x										
Yellow-billed Cuckoo								x			
Yellow-crowned Night-Heron	x							x		x	
Fish (6)											
Greater Redhorse										x	x
Lake Sturgeon										x	
Redside Dace											x
River Redhorse										x	
Shoal Chub (Speckled Chub)										x	
Western Sand Darter										x	

Species of Greatest Conservation Need	Emergent Marsh	Floodplain Forest	Great Lakes Beach	Northern Dry-mesic Forest	Northern Mesic Forest	Northern Sedge Meadow	Northern Wet-mesic Forest	Shrub-Carr	Southern Sedge Meadow	Warmwater Rivers	Warmwater Streams
Herptiles (7)											
Blanding's Turtle	x							x	x	x	x
Butler's Garter Snake	x							x	x		
Four-toed Salamander	x							x	x		
Mudpuppy										x	
Northern Ribbon Snake								x			
Pickerel Frog	x							x	x	x	x
Wood Turtle								x	x	x	x
Mammals (4)											
Eastern Red Bat	x							x	x	x	x
Hoary Bat	x							x	x	x	x
Northern Long-eared Bat	x							x	x	x	x
Silver-haired Bat	x							x	x	x	x

LAND USE AND SOCIO-ECONOMIC CHARACTERISTICS

DEFINING THE REGION

Most of the available land use, population, and recreational data and information for the state are organized by county. The Applied Population Laboratory (APL) at the University of Wisconsin-Madison has divided the state into 10 regions comprised of various county groupings, and prepared socio-economic profiles for each region. These profiles are the primary source of information for the following sections.

The GBPG is located within Brown, Oconto, and Marinette counties. Oconto and Marinette counties fall into Region 3 (APL 2010a), which also includes Florence, Forest, Langlade, Lincoln, and Menominee counties. Brown County falls into Region 7 (APL 2010b), which also includes Door, Kewaunee, and Manitowoc counties. This analysis will focus on the three counties of the plan area, expanding to include the larger Regions (3 or 7) as appropriate.

LAND USE

Region 3 generally is characterized by its extensive forest cover, low development, and a significant percentage of public conservation land. In contrast, Region 7 has more agricultural land and more development, relatively little forest, and the lowest amount of public conservation land of any region in the state. These differences are reflected in Table 4, which gives percentages of land area across major land use categories for the three plan area counties.

Table 4. Major Land Uses of the GBPG Counties.

Land Use	Brown	Oconto	Marinette
Agriculture	50.2%	25.4%	10.4%
Forest	8.6%	27.5%	42.3%
Wetland	4.3%	6.9%	6.7%
Residential	18.9%	6.5%	7.4%
Commercial	6.2%	0.7%	0.7%
Public conservation land	0.7%	29.7%	30.3%

Sources: APL 2010a, b.

Marinette and Oconto counties have relatively high proportions of agricultural land compared to the rest of Region 3, but much lower than Brown County, which also has the highest amount of residential and commercial land, concentrated in the Green Bay metropolitan area. Marinette and Oconto both have similar amounts of public conservation land; almost a third of their land area falls into this category. Brown County stands in stark contrast to this with only 0.7% in public conservation land, the lowest in all of Region 7. Department-owned lands in Brown County include Heritage Hill and Lost Dauphin State Parks; portions of the Devil’s River, Mountain-Bay, and Fox River State Recreational Trails; and Holland Wildlife Area.

Most of the public conservation lands in Oconto and Marinette counties are concentrated in the northern portions of both counties, far from the GBPG properties. The largest holdings are federal (Chequamegon-Nicolet National Forest) and county lands (Marinette County Forest and Oconto County Forest). There also are scattered open Managed Forest Law (MFL) and Forest Crop Law (FCL) lands, which are privately owned but open to the public for hunting, fishing, hiking, sight-seeing, and cross-country skiing. Most of these are small parcels but there are two large tracts in northwest Marinette County that are part of the Wild Rivers Forest Legacy Area. Other Department-owned lands in Marinette County include the North Branch Beaver Creek Fishery Area; Peshtigo River State Forest; Dunbar Barrens State Natural Area; Governor Thompson State Park; Menominee River State Recreation Area; Amberg, Town Corner, Miscauno, and Lake Noquebay Wildlife Areas; and Pike Wild River. Those in Oconto County include the South Branch Oconto River Fishery Area; Copper Culture State Park; Nicolet and Oconto River State Trails; and Peshtigo Brook Wildlife Area.

Land values are higher in Region 7 than in Region 3, and higher than the state average in all categories save residential/commercial. Brown County has the highest land values in Region 7. Land values are somewhat higher in Oconto County (except in the agriculture category, where Marinette is higher) than in the rest of Region 3 due to its proximity to Green Bay, but significantly lower than Brown, and are either similar to or lower than the state average.

Both Regions 3 and 7 saw a conversion of undeveloped agricultural land to residential or commercial uses between 2000 and 2008. Region 3 experienced a slight loss of forested

acres, while Region 7 gained forested acres. All three plan area counties lost agricultural acres to development, though Brown and Oconto counties also gained forested acres. Both regions also experienced parcelization, or the subdividing of large tracts of agricultural or forested land into smaller parcels. This phenomenon often increases development and fragments natural habitats, and also can make implementing management or coordinating recreation access more challenging due to the increased numbers of landowners, some of whom may have conflicting views. Parcelization was evident in all 3 plan area counties between 2000 and 2008, and was particularly widespread in Brown and Oconto counties.

TRANSPORTATION NETWORK

Much of the region around the GBPG properties is not well served by major highways. The exception is in the southern portion of the plan area near Green Bay, which is one of the state's major metropolitan areas and has a good highway infrastructure, including Interstate 43 and various US and state roads.

US Highway 41 is the major road serving the plan area, traversing all 3 counties just to the west of the plan area from Green Bay to Peshtigo, and connecting the plan area with population centers in Green Bay and the Fox Valley. State Highway 22, which ends in the City of Oconto, connects the central portion of the plan area to points west and south. The plan area also has a network of county and town roads.

POPULATION

Table 5 summarizes key population data for the three counties of the plan area. These data reflect the differences in population characteristics across the GBPG from south to north. Brown County is by far the most populous of the three counties, with the City of Green Bay and its surrounding suburbs being particularly densely populated. Green Bay is the largest city in Region 7 and the third-largest in the state. Region 7 is much more densely populated than Region 3, although this is partially because it has a relatively small land area. Oconto County in the southeast portion of Region 3 is considered to be part of the Green Bay metropolitan area because of the large number of residents who commute to Green Bay for work, and is more densely populated than the rest of the region. Marinette County had a slightly higher population than Oconto County in the 2010 Census, though a lower population density, and contains Region 3's largest city, Marinette.

Table 5. Population Trends of the GBPG Counties.

	Brown	Oconto	Marinette
2000 Census population	226,658	35,652	43,384
2010 Census population	248,007	37,660	41,749
Percent change, 2000-2010	+9.4%	+5.6%	-3.8%
Projected 2030 population	306,931	49,501	47,415
Percent change, 2010-2030	+23.8%	+31.4%	+13.6%

ANALYSIS OF THE REGIONAL CONTEXT

	Brown	Oconto	Marinette
2010 population density (persons/square mile)	468.2	37.7	29.8

Sources: APL 2010a, b; Wisconsin Demographic Services Center 2011.

Marinette County experienced a slight population decline between the 2000 and 2010 Censuses, the only one of the three counties to do so. Oconto County's population grew modestly, at a rate slightly less than the 6% experienced by the state as a whole during the same time period, while Brown County grew by almost twice as much as Oconto. All three counties are expected to increase in population over the next two decades, though at quite different rates. Brown and Oconto counties are expected to increase significantly in population at rates faster than in the past, with Oconto displaying the greater rate of growth. The largest increases are expected in suburban and exurban areas associated with Green Bay as well as in northern Oconto County. Brown County currently is the fourth most populous county in Wisconsin, and is expected to retain this rank through 2035 (Egan-Robertson et al. 2008). Marinette County is projected to grow at a much slower rate, with the largest increases expected in towns in the central part of the county. The City of Marinette has declined in population over the past decade, and this decrease is expected to continue.

In terms of age structure, Region 3's population is older than that of Region 7 and of Wisconsin as a whole, and is aging faster. Region 3 had a median age of 42.3 years in 2008, compared to 38.1 for the state overall, and the median age is expected to approach 47 by 2020. Marinette County reflects this. It is one of the most rapidly aging counties in Region 3, with 1 in every 4 residents projected to be over the age of 65 by 2020. In contrast, Oconto County is unique in Region 3 in that its population is somewhat younger and not aging as rapidly as most of the other counties in that region. This is due to a net in-migration of families with children during the 2000s. Region 7's age structure is similar to that of the state as a whole, having a median age in 2008 of 38.5 years compared to 38.1 for Wisconsin overall. The pace of aging is moderate, with a projected median age of 39.5 by 2020. Brown County is somewhat unique in being the only county in Region 7 with a significant young population, and it displays a slower projected rate of aging than the other counties and the region as a whole.

Both Region 3's and 7's populations are overwhelmingly White, though minority populations are growing. American Indians are the largest minority group in Region 3 and Hispanics are the largest minority in Region 7. Of the three plan area counties, Brown is by far the most diverse and the county that has seen the largest increase in minority populations since 2000. Hispanic children make up a growing proportion of young residents in Region 3 and both Hispanic and Black children do so in Region 7, indicating that these groups will continue to increase in representation.

ECONOMIC CONTEXT

The employment picture is generally similar between Regions 3 and 7. Manufacturing, health care and social assistance, retail trade, and accommodation and food services were

the top employers in both regions in 2008. Manufacturing employed the most people in both regions between 2000 and 2008, but also was the industry that showed the greatest declines in employment during this time period, decreasing by 5.4% in Region 7 and 10.9% in Region 3. Both regions also saw significant declines in retail trade and construction employment, and significant gains in health care and social assistance. Within the plan area counties, Oconto County had the greatest decrease in manufacturing employment. All 3 counties gained strongly in health care and social assistance, particularly Oconto, and Brown County showed the sharpest decrease in retail trade.

Employment in industries related to tourism and recreation, which include arts, entertainment, recreation, accommodation, and food services, is an important part of the economies of both Regions 3 and 7, employing 10.4% and 10.5% of all workers, respectively. Employment in these industries grew in both regions between 2000 and 2008. For the plan area counties, growth was the strongest in Brown County. Oconto County showed only slight growth, and Marinette County experienced a decline.

The two regions differ in employment in extractive industries, those which entail extracting value from the earth's natural resources for profit, and include agriculture, forestry, fishing, hunting, and mining. Extractive industries (mostly in agriculture as hired labor or farm operators) account for 9.2% of total employment in Region 3, but only 3.9% in Region 7. This is mirrored in the plan area counties. Extractive industries employed only 1.6% of workers in Brown County in 2007. In Marinette County the number was 6.4% and in Oconto County it was 14.7%, making that county the most dependent on extractive employment in all of Region 3. Like manufacturing, employment in extractive industries has declined in both regions, particularly in hired farm labor. Oconto and Marinette counties showed the two steepest declines in Region 3 between 1997 and 2007, while Brown County had the smallest decline in Region 7.

The economies of both regions are in transition, a shift that generally is reflected in the plan area counties. There is movement away from manufacturing, construction, and extractive industries and towards an economy based more on services, including recreation and tourism.

RECREATION RESOURCES, USE, AND DEMAND

DEFINING THE REGION

The *Statewide Comprehensive Outdoor Recreation Plan (SCORP)* is the primary source of information on outdoor recreation in Wisconsin. The SCORP periodically evaluates status, trends, demand, and needs for outdoor recreation throughout the state using a variety of public surveys, interviews, and listening sessions. The current plan is for the period 2011-2016 (WDNR 2012). This plan examines broad recreational trends across the state with a focus on developing a strategy to integrate Wisconsin into America's Great Outdoors, a national initiative launched by President Obama in 2010 that encourages state and local communities to develop local, grassroots conservation and recreation initiatives. This approach contrasts with that used in the 2005-2010 SCORP

(WDNR 2006c), which divided Wisconsin into 8 planning regions, each representing a particular combination of demographic trends, tourism influences, and environment types, and assessed current and future recreational trends and needs in more detail within each region. The current analysis draws on both of these plans in order to characterize the recreational context of the plan area, as well as on individual county outdoor recreation plans where these are available.

Regional Characteristics: The 2005-2010 SCORP

The GBPG falls within the Upper Lake Michigan Coastal Region, one of the 8 regions profiled in the 2005-2010 SCORP. The following is an excerpt from the description of this region:

“The Upper Lake Michigan Coastal Region is located in the northeast part of the state and encompasses Brown, Door, Kewaunee, Manitowoc, Marinette, and Oconto Counties. The region as a whole is heavily influenced by its association with Lake Michigan, with each of the region’s six counties containing some portion of the lake’s shoreline. Although many residents and visitors to the region use Lake Michigan for their recreational needs, other water resources such as the Peshtigo River, Popple River, and Pike River also attract visitors with their abundant fishing and paddling opportunities. Urban resources also affect the Upper Lake Michigan Coastal Region. Green Bay, the region’s urban center, impacts much of its surrounding area with its suburban growth and cultural resources.” (WDNR 2006c, p. 5-3)

The 2005-2010 SCORP compared and contrasted participation rates in recreational activities among both Wisconsin residents and out-of-state visitors; public perspectives on issues creating impediments to recreation and recreation needs; and regional supply shortages among the different regions. Table 6 summarizes these characteristics for the Upper Lake Michigan Coastal Region.

Table 6. Recreational Characteristics of the Upper Lake Michigan Coastal Region.

Highest Participation Rate*	Top-ranked Activities among Non-residents	Recreation Issues	Regional Supply Shortages
<ul style="list-style-type: none"> • Family gathering • Snow/ice activities (any type) • Golf • Target shooting • Off-road 4-wheel driving (SUV) • Ice-skating outdoors • Cross-country skiing • Fishing in the Great Lakes • Rowing • Snowboarding • Ice hockey outdoors 	<ul style="list-style-type: none"> • Boating • Camping • Canoeing • Downhill skiing • Fishing • Hiking • Sight-seeing 	<ul style="list-style-type: none"> • Lack of funding for park/recreation maintenance • Increased ATV usage & associated impacts • Increasing multiple-use recreation conflicts • Invasive species • Loss of public access to lands & waters • Poor water quality impairing recreation • Protection of fragile areas 	<p>Nature-based:</p> <ul style="list-style-type: none"> • Campsites-non-electrical • Parks • Trails—cross-country ski • Trails—hiking • Trails—horseback riding • Trails—mountain biking <p>Developed Setting:</p> <ul style="list-style-type: none"> • Basketball courts • Boat equipment providers • Dog parks (urban) • Playground facilities • Horseback riding clubs

ANALYSIS OF THE REGIONAL CONTEXT

Highest Participation Rate*	Top-ranked Activities among Non-residents	Recreation Issues	Regional Supply Shortages
<ul style="list-style-type: none"> • Skateboarding • Scuba diving • Wind surfing 			<ul style="list-style-type: none"> • Shooting ranges • Soccer fields • Tennis courts • Volleyball courts • Waterparks

* These are the activities for which the Upper Lake Michigan Coastal Region had the highest participation rates (among Wisconsin residents) of any region in the state.

Source: WDNR 2006c.

The 2005-2010 SCORP also considered larger areas within each region that provide space for popular regional activities. Drawing upon the *Wisconsin Land Legacy Report* (Pohlman et al. 2006), which identifies those places most important to meeting the state's conservation and recreation needs over the next 50 years, the SCORP identified those Legacy Sites in each region providing recreational opportunities that could serve the recreational needs of the entire region. These sites are considered the region's top priority sites to preserve and protect for recreation. Of the top 5 sites for the Upper Lake Michigan Coastal Region, the Peshtigo River, a portion of which flows through the northern part of the plan area, was ranked fourth.

Future Trends: The 2011-2016 SCORP

The 2011-2016 SCORP includes an examination of changes in participation in a variety of recreational activities in Wisconsin over a 15-year period from 1994 to 2009. Using these data as well as industry forecasts and opinions of recreation professionals, this SCORP presents projected trends identifying activities that will show increasing, stable, and decreasing demand over the next 5 years. These are shown in Table 7.

Table 7. Projected Trends in Wisconsin Recreational Activities.

Increasing Demand	Stable Demand	Decreasing Demand
<ul style="list-style-type: none"> • Adventure racing • Driving for pleasure • Developed/RV camping • Kayaking • Visit a dog park • Soccer outdoors • BMX biking • Climbing • Stand up paddling/paddleboarding • Triathlon (on- and off-road) • Off-highway vehicle driving • Gardening or landscaping for pleasure 	<ul style="list-style-type: none"> • Walking for pleasure • Running or jogging • Waterparks • Motor boating • Day hiking • Golf • Tent camping • Snowboarding • Trail running • View/photograph wildlife • Bicycling (road and non-paved) • Snowshoeing 	<ul style="list-style-type: none"> • Hunting • Inline skating • Skateboarding/skate parks • Horseback riding on trails • Softball • Downhill skiing

RECREATION IN THE PLAN AREA COUNTIES

As with other socio-economic characteristics described above, the three plan area counties share some similarities in terms of recreational resources and demands but also display some rather significant differences. The biggest similarity is the importance of water-based recreation. All three counties have shoreline on Green Bay as well as a variety of rivers, streams, and inland lakes that provide ample opportunity for boating, fishing, sailing, paddling, and other water-based activities. The strongest contrast is that between Brown County, which has little public recreation land and the strong urban influence of the City of Green Bay, and Oconto and Marinette counties, which are much more rural and have large amounts of public land.

Brown County's park facilities are more strongly geared toward serving urban/suburban recreational interests (Brown County 2008). The county park system features many developed facilities such as playgrounds, baseball fields, volleyball and basketball courts, enclosed shelters, and a dog park, but limited opportunity for activities such as hunting. Some bicycling and hiking trails exist but trail opportunities are limited in the county for activities such as horseback riding, cross-country skiing, and snowmobiling. In contrast, Marinette and Oconto counties have much larger acreages of both county-owned and state-owned lands. Oconto County also contains a portion of the Lakewood-Laona District of the Chequamegon-Nicolet National Forest (CNNF). These two counties offer more opportunity for a wider variety of nature-based recreational activities, especially hunting and trapping but also fishing, hiking, paddling, swimming, and wildlife viewing. Oconto and Marinette also offer many more miles of trails for motorized activities such as snowmobiling and ATV use (Marinette County 2007, Oconto County 2006).

Camping

Camping is available in the plan area counties at state, federal, county, municipal, and private facilities. Facilities exist for RV-style camping and tent camping. Many campsites are electrified, but primitive sites also are available. Brown County offers camping on two of its county parks, one of which, the Brown County Fairgrounds, serves urban campers. Oconto County also has developed campgrounds on two of its county parks and additionally offers 37 primitive sites on the Oconto County Forest that are available by permit (Oconto County 2006). The Oconto County portion of the CNNF contains four campgrounds—Bagley Rapids, Boot Lake, Boulder Lake, and Fanny Lake—which together offer 168 sites. Boulder Lake is the CNNF's largest campground and offers electrified sites, group sites, and RV sites. Marinette County offers the greatest diversity of camping opportunities. Six county parks have camping facilities, including one campground catering to ATV users and several having handicapped-accessible sites. Rustic or primitive camping is also allowed anywhere on the Marinette County Forest with a permit. Several communities have parks that offer public camping (Marinette County 2007). Marinette also is the only one of the plan area counties containing state-owned lands allowing camping. Governor Thompson State Park and Peshtigo River State Forest both have campgrounds and boat-access campsites. The Menominee River State Recreation Area offers primitive campsites, including 3

canoe/walk-in sites. WE Energies owns land and operates various hydroelectric facilities along several rivers in northeast Wisconsin and the Upper Peninsula of Michigan. The company makes some 32,000 acres of land associated with these facilities available for public recreation as the Wilderness Shores recreation area, and maintains sites that provide various recreational amenities. The Wisconsin portion of Wilderness Shores is along the Menominee River in Marinette County. One site in the Town of Amberg, north of the White Rapids Dam, offers 10 primitive campsites.

Hunting, Trapping, and Shooting

Brown County has the least amount of public hunting land of the plan area counties. Limited hunting opportunities for deer and waterfowl are available on several county parks. Besides the GBPG properties, Brown County's only other state wildlife area, Holland Wildlife Area, is heavily used, especially for pheasant hunting (Brown County 2008). Marinette and Oconto counties have large tracts of public lands open to hunting and trapping. Opportunities exist for large and small game, including deer, bear, waterfowl, grouse, turkey, woodcock, mink, otter, beaver, muskrat, fisher, coyote, and bobcat. Most of the Marinette County Forest (231,000 acres) and Oconto County Forest (43,345 acres) are open to hunting and trapping, as are the national forest, state-owned wildlife and fishery areas, state forest, state recreation area and state natural area. Governor Thompson State Park is open for the 9-day gun deer season. The WE Energies-owned Wilderness Shores recreation area is also open to hunting.

There are four shooting ranges in the plan area counties. The Brown County Rifle Range, located on the Reforestation Camp county park, is a 100-yard range open to the public only in the fall, just prior to the hunting season, for sighting in firearms. The Oconto County Machickanee Forest Shooting Range, located in the Town of Morgan, is open to the public year-round. A third range is located on the Badger Gift Lands just north of the Peshtigo Harbor Unit of the Green Bay West Shore WA in Marinette County. The fourth range is operated by the Marinette Police Department and located behind the US Highway 41 wayside between Marinette and Peshtigo. This range is open to the public on several weekends prior to the fall deer-gun hunting season and at other times by contacting the Marinette Police Department.

Trails

Five state trails pass through the plan area, three in Brown County and two in Oconto County. In Brown County: a 1.5-mile segment of the **Devil's River State Trail** runs from Denmark to the county line; 20 miles of the **Fox River State Trail** extend from downtown Green Bay south to the Brown-Calumet county line; and the **Mountain-Bay State Trail** runs for 13 miles from Howard to Pulaski. In Oconto County, a 30-mile segment of the **Nicolet State Trail** runs northwest from Gillett to Townsend, and the entire 8-mile **Oconto River State Trail** extends between Oconto and Stiles Junction. State trails generally are open to walking, jogging, bicycling, and dog-walking; other activities vary by trail and by county. The urban portion of the Fox River Trail is asphalt-paved for some 10.5 miles and is open to inline skating. This portion of the trail also

features interpretive signage about the history of Green Bay and the Fox River. The southern segment of the trail is surfaced with gravel, and six miles of it are open to horseback riding. Snowmobiles are permitted on all 1.5 miles of the Devil’s River Trail, 7 miles of the Fox River Trail, and 5.5 miles of the Mountain Bay Trail in Brown County. All of the Oconto River State Trail and the entire Oconto County portion of the Nicolet State Trail are open to snowmobiles. ATVs are allowed on the Nicolet State Trail from May 1 to October 31 and horses from April 15 to November 10. All five trails also are open to snowshoeing and cross-country skiing, but the trails are not groomed and users must share the trails with snowmobiles.

A variety of trail opportunities exist on federal, state and county lands in all three counties. Some trails are designated and maintained for a particular use and others are multiple-use. Other opportunities consist of service roads or access roads that are open to different uses. Trails may also have seasonal restrictions. Table 8 summarizes the state and county trail opportunities for the three plan area counties. Additional opportunities exist on municipal facilities and on private lands.

Table 8. Trail Opportunities on Public Lands in the GBPG Counties.

Activity	Brown	Oconto	Marinette
ATV	-	100	232
Bicycling (off-road)	59	73	74
Cross-country skiing	79	86	82
Hiking/walking	53	101	90
Horseback riding	16	59	35
Snowmobile	36	426	489

Notes:

1. All units are in miles.
2. Table includes only trail opportunities on federal, state, and county lands.
3. Figures may include both formally designated/maintained and informal opportunities.
4. Sources: Brown County (2008); Marinette County (2007); Oconto County (2006); and recreation information on county, CNNF, and WDNR Web sites:
 - <http://www.co.brown.wi.us/>
 - <http://www.marinettecounty.com/>
 - <http://www.co.oconto.wi.us/> and <http://www.ocontocounty.org/>
 - <http://www.fs.usda.gov/cnnf>
 - <http://dnr.wi.gov/>

Water-based Activities

All three plan-area counties have significant water resources. Green Bay is a significant resource common to all three counties. Brown County’s largest river is the Fox. It also has numerous smaller rivers and streams, including Duck Creek, the East River, and the Suamico River, as well as three named lakes. Oconto County has 379 named lakes, 7 flowages, and 1,073 miles of streams, including 316 miles of trout streams. The Oconto River is the county’s largest river; others include the Little River, Little Suamico River, and Pensaukee River. Oconto County also has 14 designated “Wild Lakes” that are open only to non-motorized watercraft or those with electric motors, and four stream segments

totaling 65 miles that are classified as Outstanding or Exceptional Resource Waters. Marinette County has 442 lakes, six of which are designated as “Wild Lakes”. It has 304 rivers and streams totaling 902 miles, 614 miles of which are classified as trout waters. Lake Noquebay is the county’s largest lake. Major rivers include the Menominee, Pemebonwon, Peshtigo, Pike, and Wausaukee rivers. The Pike is a state-designated Wild River, one of only four in Wisconsin.

These resources support numerous water-based activities. Recreational boating, including motor boating, power boating, and sailing, is popular. Lower Green Bay and the lower Fox River support major sport fisheries for species such as walleye, yellow perch, and musky. Both shore and boat fishing opportunities exist for a variety of species including panfish, trout, walleye, smallmouth bass, musky, and Northern pike. Many lakes and rivers provide opportunities for canoeing and kayaking. Portions of the Pike, Peshtigo, and Menominee rivers offer rapids for whitewater paddling. Larger lakes and flowages can accommodate jet skiing and water skiing. Marinette County features a unique activity with its Waterfalls Tours, a series of four tours showcasing 14 different waterfalls.

Wildlife Viewing and Outdoor Education

The public lands of the plan area counties offer diverse wildlife viewing opportunities. All three counties fall within the Lake Michigan region of the Great Wisconsin Birding and Nature Trail (GWBNT), a mapped auto trail extending throughout the state that directs visitors to sites offering outstanding bird-watching and other nature viewing opportunities. There are six GWBNT waypoints in Brown County, five in Oconto County, and five in Marinette County (WDNR 2006d). Of these 16 waypoints, four are on the GBPG properties. Viewing opportunities for waterbirds such as gulls, terns, pelicans, and herons are especially significant.

Several facilities offer outdoor education programs. In Brown County, the Barkhausen Waterfowl Preserve, a Brown County park, hosts the **West Shores Interpretive Center**, which offers hand-on displays and environmental and nature education programs throughout the year. Another Brown County park, the Reforestation Camp, is home to the **NEW Zoo**, which offers interpretive and educational programs featuring wildlife and conservation themes. The **Bay Beach Wildlife Sanctuary**, located in the City of Green Bay, has hands-on exhibits, live animal exhibits, and a wide variety of nature/wildlife programs for both the general public and for school and community groups. The **Harmony Arboretum** is a Marinette County park that offers nature and environmental education programs and activities for adults and children.

ANALYSIS OF THE PROPERTIES

GREEN BAY PLANNING GROUP PROPERTIES

The Green Bay Planning Group (GBPG) consists of 12 named properties and several other state-owned parcels scattered along the west shore of Green Bay (Map B). Eleven of the named properties are units of the Green Bay West Shore WA. The Bloch Oxbow SNA comprises the twelfth named property. There also is a large tract of state gift lands, various parcels acquired under the authority of the Scattered Fishery Habitat and Statewide Wildlife Habitat Area programs, and some transferred DOT mitigation site acres. All the properties are described briefly below.

An 757-acre gift lands parcel, known as the **Badger Gift Lands**, is located approximately one mile south of the City of Peshtigo, along the Peshtigo River in Marinette County. It is directly north of, and adjacent to, the Bloch Oxbow SNA and the Peshtigo Harbor Unit of the Green Bay West Shore WA.

The **Bloch Oxbow SNA** (597.5 acres) is located about four miles south of the City of Peshtigo in Marinette County, on sandy upland above the Peshtigo River.

The eleven units of the **Green Bay West Shore WA** are:

- The **Peshtigo Harbor Unit** (4,812 acres), the northernmost of all the Green Bay West Shore WA units. It is located in Marinette County at the mouth of the Peshtigo River and upstream along both sides. It is adjacent to, and south and east of, the Bloch Oxbow SNA. It encompasses two SNAs, the Peshtigo Harbor Lacustrine Forest and the Peshtigo River Delta Marshes.
- The **Rush Point Unit** (384 acres), located in Oconto County about seven miles northeast of the City of Oconto.
- The **Oconto Marsh Unit** (927 acres), located in Oconto County about one mile northeast of the City of Oconto.
- The **Pecor Point Unit** (89 acres), located in Oconto County about two miles northeast of the Town of Pensaukee.
- The **Pensaukee Unit** (515 acres), located in Oconto County just south of the Town of Pensaukee.
- The **Charles Pond Unit** (152.5 acres), located in Oconto County about five miles southwest of the Town of Pensaukee. This unit consists of the Charles Pond SNA.
- The **Tibbett-Suamico Unit** (308 acres), located in Oconto County about one mile east of the Town of Little Suamico.
- The **Little Tail Unit** (243 acres), located in Brown County about three miles north of the Village of Suamico.

- The **Sensiba Unit** (637 acres), located in Brown County about one mile east of the Village of Suamico, north of the Suamico River.
- The **Long Tail Unit** (317 acres), located in Brown County about one mile east of the Village of Suamico, south of the Suamico River.
- The **Peats Lake Unit** (491 acres), the southernmost of the Green Bay West Shore WA units. It is located in Brown County about one mile north of the City of Green Bay.

There also are eight parcels, comprising 298.5 acres, of Scattered Fishery Habitat and Statewide Wildlife Habitat Areas: one parcel in Marinette County; three in Oconto County, and three in Brown County. There also are 125.5 acres of transferred DOT wetland mitigation in Brown County.

PHYSICAL ENVIRONMENT

Much of the information for the following sections is taken from the *Rapid Ecological Assessment for the Green Bay West Shores Wildlife Area* (WDNR 2010).

TOPOGRAPHY AND SOILS

The GBPG properties occur on ground moraine and lacustrine plains. The lacustrine plains are created where rivers such as the Oconto, Pensaukee, Suamico, and Peshtigo, as well as Duck Creek and other smaller rivers and streams, create deltas upon entering Green Bay. Important landform features are also created by long-shore currents in Green Bay. The plan area occurs within three different Land Type Associations (LTAs), each having characteristic landforms and soils associated with it:

- Lewiston Basin (212Te10): the characteristic landform pattern is nearly level lake plain with many swamps. Soils are predominantly somewhat poorly drained loamy fine sand over sandy lacustrine.
- Brookside Moraines (212Tb28): the characteristic landform pattern is nearly level till and lake plain complex. Soils are predominantly somewhat poorly drained fine sandy loam over calcareous loamy till or lacustrine.
- Green Bay Plains (212Zb06): the characteristic landform pattern is nearly level lake plain with scattered low dunes. Soils are predominantly somewhat poorly drained loamy fine sand over sandy and silty lacustrine and beach deposits.

The gradual sloping west shore of Green Bay is a combination of low, erodible plains and wetlands which are subject to periodic and occasional flooding. The Tendrow-Roscommon, Wainola-Deford, and Kinross-Deford-Angelica Associations are the most widespread soils immediately inland from the Green Bay shoreline. These soils are loamy fine sands, fine sandy loams, and loams of lacustrine origin which are deep, nearly level, and poorly drained. The water table in these soils is near the surface especially

during wet periods. These soils also are low in natural fertility, which severely limits agriculture. Residential development and recreation (in the form of camping, picnicking and trails) are also limited due to wetness, flooding, or blowing when exposed soils become droughty. Most of these soils occur in low quality woodlots, pasture, or brush and recommendations for use include wildlife habitat, hunting, and outdoor recreational education.

The Rousseau-Shawano Association is found mixed with the Wainola-Deford Association just south of the Oconto area and occurs on the lake borders and outwash plains. This soil association is comprised of loamy fine sands which are nearly level and moderately well drained to well drained. The soils are subject to wind erosion when exposed and are low in soil fertility, again limiting agricultural use. Most of the area of this soil type on the west shore is in second growth timber or brush. Some forms of recreation (camping, picnicking, and trails) are moderately to severely limited due to susceptibility of the soil to damage from repeated trampling and disturbance. Compatible uses include wildlife habitat, hunting, and nature observation and study.

Some marshes and swamps adjacent to the shoreline have developed moderately deep and very poorly drained, nearly level, organic soils. The Carbondale-Cathro-Marsh Association dominates the Peats Lake Unit in the south. The Markey Muck Series occurs periodically along the entire west shore but is particularly evident in the Peshtigo Harbor Unit. It consists of an herbaceous organic material over a sandy substrate and often occurs jointly with the Lupton Muck, a woody organic soil in the northern part of the west shore. Also present in the Peshtigo Harbor Unit area is the Saprists Aquents, a variable inundated soil. All of these organic soils, when drained, are moderately suited to crops but are subject to blowing and consolidation when exposed. The majority of these soils are vegetated with water tolerant grasses, sedges, shrubs, and trees. Their use for timber production or as residential and recreational areas is severely limited. Compatible uses include wildlife habitat, hunting, and education.

HYDROLOGY

Water levels in Green Bay are extremely important to both ecological form and function within the plan area. The elevation of many of the wetlands is equal to the elevation of the bottom of Green Bay. This results in waters of the bay flowing through these wetlands and accumulating behind them. Daily, seasonal, and long-term water level changes within the plan area affect the distribution and extent of plant communities and of the fish and wildlife communities that use them. Daily changes, produced by seiches (short-term (hours to days), irregular water level oscillations caused by a combination of rapid changes in barometric pressure, currents, winds, and the physical attributes and orientation of large waterbodies), can inundate a dry area with a few inches of water and then dry out again. Seiches can be significant in Green Bay due to its long, narrow shape, relatively shallow water depth, and the morphology of its basin. Annual flooding events produce water flow in small streams and tributaries for a month or two, creating important wildlife habitat and fish spawning areas. Longer-term changes, due to drought or extended wet periods, can have large impacts on the ecology of the area. Wetland

natural communities within the GBPG shift depending on water levels. For example, an Emergent Marsh may shift to Southern Sedge Meadow, Shrub-carr, and eventually Southern Hardwood Swamp as water levels decrease. A rise in the water level of Green Bay may then inundate the area, killing trees and shrubs and possibly shifting the natural community back to Emergent Marsh. High water also can diminish the extent of coastal wetlands due to deeper water, increased turbidity, and wave or ice erosion.

VEGETATION

Presettlement Vegetation

Data from the original Public Land Surveys often are used to identify and map the distribution of vegetation cover types that were present in Wisconsin prior to widespread Euro-American settlement. Public Land Surveys for the area comprising the GBPG were conducted between 1836 and 1840. Finley’s (1976) Original Vegetation Map describes this area as dominated by marsh, sedge meadow, wet prairie, and lowland shrubs, with swamp conifers and oak forests also common. Table 9 lists these cover types and their percentages.

Table 9. Presettlement Vegetation Cover for the GBPG Properties (from Finley 1976).

Vegetation Type	% cover
Marsh and sedge meadow, wet prairie, lowland shrubs	48
Swamp conifers—white cedar, black spruce, tamarack, hemlock	30
Oak—white oak, black oak, bur oak	15
Hemlock, sugar maple, yellow birch, white pine, red pine	5
Beech, sugar maple, basswood, red oak, white oak, black oak	1
Beech, hemlock, sugar maple, yellow birch, white pine, red pine	<1
Water	<1
Sugar maple, basswood, red oak, white oak, black oak	<1

Current Vegetation

Currently, the vegetation of the GBPG is dominated by a matrix of wetland natural communities, varying from open to shrub-dominated to forested. Wetland communities include Emergent Marsh, Great Lakes Beach, Southern Sedge Meadow, Shrub-carr, Riverine Mud Flat, Southern Hardwood Swamp, and Floodplain Forest. Upland areas are much more limited in extent, and typically consist of Northern Dry-mesic Forest. Land use surrounding the GBPG properties is dominated by agriculture with several large population centers, especially the Green Bay metropolitan area but also the cities of Peshtigo and Oconto.

Wetland Communities

Great Lakes Beaches of the GBPG are narrow, dynamic systems that change based on Lake Michigan's water level and storm events. The amount of vegetation cover varies. Some sites have scattered, mostly open sand areas with common evening-primrose (*Oenothera biennis*), witch grass (*Panicum capillare*), common cocklebur (*Xanthium strumarium*), and the invasive variety of common reed grass (*Phragmites australis*). More densely vegetated areas have nodding beggar-ticks, curly-top knotweed (*Polygonum lapathifolium*), rice cut grass (*Leersia oryzoides*), southern hair grass (*Agrostis hyemalis*), plains cottonwood seedlings (*Populus deltoides*), cursed crowfoot (*Ranunculus sceleratus*), dotted smartweed (*Polygonum punctatum*), bald spike-rush, Pursh's bulrush, green ash (*Fraxinus pennsylvanica*), meadow willow seedlings (*Salix petiolaris*), Canadian horseweed (*Conyza canadensis*), Allegheny monkey-flower (*Mimulus ringens*), orange jewelweed (*Impatiens capensis*), barnyard grass (*Echinochloa crusgalli*), and the invasive reed canary grass (*Phalaris arundinacea*). Exposed sand has zebra mussel shells.

Riverine Mud Flats are found on newly exposed, damp, sandy muck flats colonized by a dense carpet of wetland herbs. Species include common agalinis, purple false foxglove (*Agalinis purpurea*), common boneset, common spike-rush (*Eleocharis palustris*), Canadian rush, Dudley's rush (*Juncus dudleyi*), black bulrush (*Scirpus atrovirens*), purple loosestrife and reed canary grass. This dynamic, somewhat ephemeral community develops in periods of low water.

Emergent Marshes of the GBPG are extensive and impacted by Lake Michigan water levels, wave action, ice scouring, and invasive species. They are dominated by broad-leaved cat-tail (*Typha latifolia*) and soft-stem bulrush (*Schoenoplectus tabernaemontani*) with associated species including common three-square bulrush (*Schoenoplectus pungens*), nodding beggar-ticks (*Bidens cernuus*), needle spike-rush (*Eleocharis acicularis*), bald spike-rush (*Eleocharis erythropoda*), false pimpinell (*Lindernia dubia*), marsh purslane (*Ludwigia palustris*), whorled water-milfoil (*Myriophyllum verticillatum*), nodding water-nymph (*Najas flexilis*), comb pondweed (*Stuckenia pectinata*), Canadian rush (*Juncus canadensis*), Pursh's bulrush (*Schoenoplectus purshianus*), algae, and the invasive variety of common reed grass (*Phragmites*). On drier, landward, less frequently inundated areas, characteristic species are common boneset (*Eupatorium perfoliatum*), blue vervain (*Verbena hastata*), and common agalinis (*Agalinis tenuiflora*). The invasive purple loosestrife (*Lythrum salicaria*) is occasional, but not dominant.

Southern Sedge Meadows of the GBPG are open wetlands dominated by tussock sedge (*Carex stricta*), blue-joint grass (*Calamagrostis canadensis*), and broad-leaved cat-tail. Shrub cover varies and is composed of meadow willow, red osier dogwood (*Cornus stolonifera*), and *Spiraea* sp. Associated species within the sedge meadow include common lake sedge (*Carex lacustris*), tussock sedge, beaked sedge (*C. rostrata*), orange jewelweed, cinnamon willow-herb (*Epilobium coloratum*), water smartweed (*Polygonum amphibium*), marsh fern (*Thelypteris palustris*), spotted Joe-Pye-weed (*Eupatorium*

maculatum), and the invasive varieties of common reed grass (*Phragmites*), purple loosestrife, and reed canary grass.

Shrub-carr occurs within open wetlands of the GBPG and has a moderate shrub cover of meadow willow, red osier dogwood, and glossy buckthorn (*Rhamnus frangula*). The ground layer is dense and dominated by tussock sedge and the invasive reed canary grass with spotted Joe-Pye-weed, Canadian goldenrod (*Solidago canadensis*), purple loosestrife, common mountain mint (*Pycnanthemum virginianum*), and paniced aster (*Aster lanceolatus*) as associates.

Southern Hardwood Swamps of the GBPG have a moderately dense canopy dominated by green ash (*Fraxinus pennsylvanica*) with slippery elm (*Ulmus rubra*) as an associate. The subcanopy has high cover of green ash, with red maple (*Acer rubrum*) and slippery elm as associates. The sapling layer has low coverage of green ash, red maple, and slippery elm. The shrub layer has a low cover of speckled alder (*Alnus incana*), mountain holly (*Ilex mucronata*), and glossy buckthorn. The ground layer has a high cover of *Impatiens* sp., fowl manna grass (*Glyceria striata*), brome-like sedge (*Carex bromoides*), nodding sedge (*C. gynandra*), blue-joint grass, and sensitive fern (*Onoclea sensibilis*).

Floodplain Forests of the GBPG occur along the Peshtigo River, and vary in quality from recently logged to mature. Canopy cover is moderate to dense. The canopy is dominated by silver maple (*Acer saccharinum*) ranging from 10-18 inches diameter at breast height (DBH), with some trees measuring 30 inches DBH. Black ash (*Fraxinus nigra*), green ash, basswood (*Tilia Americana*), swamp white oak (*Quercus bicolor*), red oak (*Q. rubra*), hackberry (*Celtis occidentalis*), and yellow-bud hickory (*Carya cordiformis*) are associates. Subcanopy cover is moderately dense to dense and consists of all canopy species. The sapling layer is sparse to moderately dense and includes all canopy species. Shrub cover varies from very sparse to moderately dense and is dominated by prickly ash (*Zanthoxylum americanum*) and hornbeam (*Carpinus caroliniana*) with buttonbush (*Cephalanthus occidentalis*) as an associate. The ground layer cover is dense with stinging nettle (*Urtica dioica*), ostrich fern (*Matteuccia struthiopteris*), Virginia wild-rye (*Elymus virginicus*), small-spike false nettle (*Boehmeria cylindrical*), calico aster (*Aster lateriflorus*), tussock sedge, nodding sedge, common lake sedge, common hop sedge (*Carex lupulina*), bent-seeded hop sedge (*C. tuckermanii*), marsh-pepper knotweed (*Polygonum hydropiper*), sensitive fern, meadow horsetail (*Equisetum pretense*), common wood-reed (*Cinna arundinacea*), creeping-Charlie (*Glechoma hederacea*), jumpseed (*Persicaria virginiana*), and clustered black snakeroot (*Sanicula gregaria*). An inclusion of northern wet-mesic forest dominated by northern white-cedar (*Thuja occidentalis*) and black ash is present. Fences indicate that these forests were grazed in the past.

Numerous small streams and drainages are extremely important to the ecology of the GBPG. Aquatic features include the Peshtigo, Oconto, Pensaukee, Suamico, and South Branch Suamico rivers; Duck Creek; Dyers Slough; and the shoreline of Green Bay.

Upland Communities

Great Lakes Barrens is rare in the state, with most examples found on Lake Superior. Within the GBPG, this natural community is atypical because it is composed of open-grown 3-6 in DBH (up to 24 in DBH) Hill's oak (*Quercus ellipsoidalis*) instead of the more typical red pine (*Pinus resinosa*) and white pine (*Pinus strobus*). The Great Lakes Barrens within the GBPG is located on an ancient sandy beach ridge with a shrub layer dominated by black huckleberry (*Gaylussacia baccata*) and American red raspberry (*Rubus idaeus*) and a ground layer dominated by Pennsylvania sedge (*Carex pensylvanica*), with bracken fern (*Pteridium aquilinum*) and poverty oat grass (*Danthonia spicata*) as associates.

Northern Mesic Forests occur on slightly higher terraces along the Peshtigo River, above the Floodplain Forests. Northern Mesic Forests of the GBPG have a canopy that is moderately dense and dominated by red oak, sugar maple (*Acer saccharum*), and hemlock (*Tsuga canadensis*) with yellow birch (*Betula alleghaniensis*), American beech (*Fagus grandifolia*), and hornbeam as associates. Canopy trees are 10-14 inches DBH, with some individuals measuring 24 inches DBH. Subcanopy cover is moderately dense with red oak, sugar maple, and hemlock. Sapling cover also is moderately dense and is dominated by sugar maple with red oak, hornbeam, American beech, and hemlock as associates. Shrub cover is sparse and dominated by beaked hazelnut (*Corylus cornuta*) with maple-leaved viburnum (*Viburnum acerifolium*) as an associate. Ground layer cover is sparse to moderate with Pennsylvania sedge, rough-leaved rice grass (*Oryzopsis asperifolia*), wild sarsaparilla (*Aralia nudicaulis*), Canada mayflower (*Maianthemum canadense*), interrupted fern (*Osmunda claytoniana*), bracken fern, and Indian cucumber-root (*Medeola virginiana*) (Special Concern). Some of these forests have been selectively logged.

Northern Dry-mesic Forests of the GBPG are found on gently rolling sandy uplands along the Peshtigo River. The canopy is dominated by red maple and red oak, with white pine, red pine, hemlock, American beech, and white oak (*Quercus alba*) and bur oak (*Quercus macrocarpa*) as associates. The subcanopy is moderately dense and dominated by red maple and red oak, with black cherry (*Prunus serotina*), hemlock, and American beech as associates. The sapling layer is moderately dense and dominated by red maple, with black cherry, white pine, red oak, hemlock, and American beech as associates. The shrub layer is moderately dense hazelnut (*Corylus sp.*), mountain holly, common blackberry (*Rubus allegheniensis*), bristly dewberry (*Rubus hispidus*), common buckthorn (*Rhamnus cathartica*), and common dewberry (*Rubus flagellaris*) as associates. The ground layer is moderately dense with wild sarsaparilla, Pennsylvania sedge, bracken fern, northern tree club-moss (*Lycopodium dendroideum*), interrupted fern, Canada mayflower, and mosses. Some areas within the forest have mesic inclusions consisting of hemlock, American beech, red maple, and red oak, as well as areas of dry forest dominated by black oak (*Quercus velutina*).

Invasive Species

Many invasive species are present within the GBPG, and some are well established. Documented invasive species include: common reed grass (*Phragmites*), purple loosestrife, common buckthorn, glossy buckthorn, moneywort (*Lysimachia nummularia*), marsh-pepper knotweed, creeping-Charlie, motherwort (*Leonurus cardiaca*), Japanese barberry (*Berberis thunbergii*), Tatarian honeysuckle (*Lonicera tatarica*), common dandelion (*Taraxacum officinale*), common St. John's-wort (*Hypericum perforatum*), reed canary grass, spotted knapweed (*Centaurea biebersteinii*), Japanese knotweed (*Polygonum cuspidatum*), Eurasian water-milfoil (*Myriophyllum spicatum*), gypsy moth, rusty crayfish, and zebra mussels.

Some of the most prolific herbaceous invasives in the plan area are common reed grass (*Phragmites*), common and glossy buckthorns, and reed canary grass. Control of many of these species has been ongoing, and such efforts will continue to be essential to restoring and managing suitable habitat for rare species.

High Conservation Value Forests

The Wisconsin DNR manages 1.5 million acres of forest statewide that are certified by the Forest Stewardship Council (FSC) and the Sustainable Forest Initiative. Forest certification requires forests to be managed using specified criteria for ecological, social, and economic sustainability. Principle 9 of the FSC-US Forest Management Standard concerns the maintenance of High Conservation Value Forests (HCVF). HCVFs are defined as possessing one or more of the following High Conservation Values:

1. Globally, regionally or nationally significant concentrations of biodiversity values (e.g., endemism, endangered species, refugia), including rare, threatened, or endangered species and their habitats;
2. Globally, regionally or nationally significant large landscape level forests, contained within, or containing the management unit, where viable populations of most if not all naturally occurring species exist in natural patterns of distribution and abundance;
3. Are in or contain rare, threatened or endangered ecosystems;
4. Provide basic services of nature in critical situations (e.g., watershed protection, erosion control);
5. Are fundamental to meeting basic needs of local communities (e.g., subsistence, health); or,
6. Are critical to local communities' traditional cultural identity (areas of cultural, ecological, economic or religious significance identified in cooperation with such local communities).

Based on the current draft criteria for defining HCVFs (FSC 2009) it is clear that the GBPG has areas that should be considered for this status. According to the results of the *Rapid Ecological Assessment* (WDNR 2010), the best HCVF candidates on the GBPG are represented by the Primary Sites described below (p. 32).

WILDLIFE RESOURCES

Game species on the GBPG properties include white-tailed deer, turkey, ring-necked pheasant, waterfowl, mourning dove, snipe, rails, and woodcock. Furbearers include raccoon, fox, coyote, skunk, opossum, mink, muskrat, beaver, and otter.

The plan area properties' location along the Great Lakes shoreline, their north-south orientation, variety of high-quality habitats, and location within a larger landscape dominated by urban and agricultural land uses makes them very important stopover sites for tens of thousands of waterfowl, shorebirds, waterbirds, raptors, and neotropical landbirds during both spring and fall migrations (Grveles et al. 2011). Sites with high structural habitat diversity, near water, are particularly important for perching and foraging.

All of the GBPG properties are encompassed by two Wisconsin Important Bird Areas (IBAs): the Lower Peshtigo River IBA and the Green Bay West Shore Wetlands IBA. IBAs are sites that protect critical habitats for birds at any stage of their life cycle (breeding, migration, or wintering). These sites were identified as IBAs in recognition of their high-quality wetland and riparian forest habitats and the value of these habitats to migrating, foraging, and breeding birds, including numerous species of conservation priority (Steele 2007).

FISH COMMUNITIES

Green Bay supports significant populations of smallmouth bass, walleye, Northern pike, yellow perch, and many nongame fish. Shallow bays containing beds of emergent and submergent marsh vegetation provide critical spawning and fry-rearing habitat for both game and nongame species. A recent major effort to reestablish the Great Lakes strain of muskellunge in the Green Bay ecosystem has created a popular trophy fishery. Rivers and streams flowing into Green Bay, including the Peshtigo, Oconto, Pensaukee, Suamico, and Little Suamico rivers, also provide important spawning habitat for walleye, Northern pike, and many other species. Introduced salmonids (rainbow trout, brown trout, Chinook salmon and coho salmon) offer seasonal angling opportunities during spawning runs. From its mouth to the first dam, the Peshtigo River is very rich in aquatic invertebrates and fish species. Several rare fish are present in this segment of the lower Peshtigo River, including lake sturgeon which is also present in the lower Oconto River (WDNR *in prep*, M. Donofrio *in litt.*).

THREATENED, ENDANGERED, AND SPECIAL CONCERN SPECIES

Numerous rare species have been documented on the GBPG properties (Table 10). Of these, five animal species and one plant species are listed as state endangered. One of these species, the piping plover, is also federally endangered. Nine animal species and two plant species are listed as state threatened.

Table 10. Documented Rare Species on the GPBG Properties (from WDNR 2010).

Common Name	Scientific Name	Year Last Observed	State Rank*	Global Rank*	State Status*
Animals					
American Bittern	<i>Botaurus lentiginosus</i>	2009	S3B	G4	SC/M
American Black Duck	<i>Anas rubripes</i>	2009	S2B	G5	SC/M
American Bullfrog	<i>Lithobates catesbeianus</i>	2009	S3	G5	SC/H
American Eel	<i>Anguilla rostrata</i>	1974	S2	G4	SC/N
American White Pelican	<i>Pelecanus erythrorhynchos</i>	2009	S1B,S1N	G3	SC/M
American Woodcock	<i>Scolopax minor</i>	2009	S4B	G5	SC/M
Bald Eagle	<i>Haliaeetus leucocephalus</i>	2009	S4B,S2N	G5	SC/P
Black Tern	<i>Chlidonias niger</i>	2006	S2B	G4	SC/M
Black-crowned Night-Heron	<i>Nycticorax nycticorax</i>	2009	S2B	G5	SC/M
Blanding's Turtle	<i>Emydoidea blandingii</i>	2006	S3	G4	THR
Blue-winged Teal	<i>Anas discors</i>	2009	S4B	G5	SC/M
Blue-winged Warbler	<i>Vermivora pinus</i>	2006	S4b	G5	SC/M
Broad-winged Skipper	<i>Poanes viator</i>	1993	S3	G5	SC/N
Brown Thrasher	<i>Toxostoma rufum</i>	2006	S4B	G5	SC/M
Canada Warbler	<i>Wilsonia canadensis</i>	2003	S3B	G5	SC/M
Caspian Tern	<i>Sterna caspia</i>	2009	S1B,S2N	G5	END
Cerulean Warbler	<i>Dendroica cerulea</i>	2003	S2S3B	G4	THR
Common Moorhen	<i>Gallinula chloropus</i>	2008	S2B	G5	SC/M
Common Tern	<i>Sterna hirundo</i>	1999	S1B,S2N	G5	END
Eastern Meadowlark	<i>Sturnella magna</i>	2009	S4B	G5	SC/M
Field Sparrow	<i>Spizella pusilla</i>	2009	S4B	G5	SC/M
Forster's Tern	<i>Sterna forsteri</i>	2008	S1B	G5	END
Golden-winged Warbler	<i>Vermivora chrysoptera</i>	2009	S4B	G5	SC/M
Great Egret	<i>Ardea alba</i>	2009	S2B	G5	THR
Greater Redhorse	<i>Moxostoma valenciennesi</i>	1976	S3	G4	THR
King Rail	<i>Rallus elegans</i>	1988	S1B	G4	SC/M
Lake Sturgeon†	<i>Acipenser fulvescens</i>	2012	S3	G3G4	SC/H
Least Bittern	<i>Ixobrychus exilis</i>	2009	S3B	G5	SC/M
Least Flycatcher	<i>Empidonax minimus</i>	2006	S4B	G5	SC/M
Longear Sunfish	<i>Lepomis megalotis</i>	1957	S2	G5	THR
Louisiana Waterthrush	<i>Seiurus motacilla</i>	1998	S3B	G5	SC/M
Mulberry Wing	<i>Poanes massasoit</i>	1993	S3	G4	SC/N
Northern Harrier	<i>Circus cyaneus</i>	2009	S3B,S2N	G5	SC/M
Osprey	<i>Pandion haliaetus</i>	2009	S4B	G5	THR
Piping Plover	<i>Charadrius melodus</i>	1940	S1	G3	END
Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>	2009	S3B	G5	SC/M
Red-necked Grebe	<i>Podiceps grisegena</i>	1993	S1B	G5	END
Red-shouldered Hawk	<i>Buteo lineatus</i>	2009	S3S4B,S1N	G5	THR
Veery	<i>Catharus fuscescens</i>	2009	S4B	G5	SC/M
Willow Flycatcher	<i>Empidonax traillii</i>	2009	S4B	G5	SC/M
Wood Thrush	<i>Hylocichla mustelina</i>	2006	S4B	G5	SC/M
Wood Turtle	<i>Glyptemys insculpta</i>	2008	S2	G4	THR
Yellow Rail	<i>Coturnicops noveboracensis</i>	1990	S1B	G4	THR
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	2009	S3B	G5	SC/M
Plants					
Adder's-tongue	<i>Ophioglossum pusillum</i>	1956	S2	G5	SC
American Sea-rocket	<i>Cakile lacustris</i>	2001	S3	G5	SC
Capitate Spikerush	<i>Eleocharis olivacea</i>	2000	S2	G5	SC
Crinkled Hairgrass	<i>Deschampsia flexuosa</i>	2007	S3	G5	SC
Downy Willow-herb	<i>Epilobium strictum</i>	2003	S2S3	G5?	SC
Few-flower Spikerush	<i>Eleocharis quinqueflora</i>	2000	S2	G5	SC
Indian Cucumber-root	<i>Medeola virginiana</i>	2007	S3	G5	SC
Many-headed Sedge	<i>Carex sychnocephala</i>	2000	S2	G4	SC

ANALYSIS OF THE PROPERTIES

Common Name	Scientific Name	Year Last Observed	State Rank*	Global Rank*	State Status*
Marsh Bedstraw	<i>Galium palustre</i>	1995	S1	G5	SC
Marsh Horsetail	<i>Equisetum palustre</i>	2003	S2	G5	SC
Northern Wild-raisin	<i>Viburnum nudum var. cassinoides</i>	2009	S2	G5T5	SC
Pale Green Orchid	<i>Platanthera flava var. herbiola</i>	2003	S2	G4T4Q	THR
Slim-stem Small-reedgrass	<i>Calamagrostis stricta</i>	1999	S3	G5	SC
Snow Trillium	<i>Trillium nivale</i>	1999	S3	G4	THR
Twining Screwstem	<i>Bartonia paniculata</i>	2003	S1	G5	SC
Variegated Horsetail	<i>Equisetum variegatum</i>	2000	S3	G5	SC
Wolf Spikerush	<i>Eleocharis wolfii</i>	2003	S1	G3G4	END
Yellow Screwstem	<i>Bartonia virginica</i>	2003	S3	G5	SC

* For an explanation of state and global ranks and state status, see <http://dnr.wi.gov/topic/NHI/WList.html>

†Record may not be mapped in NHI portal.

SITES OF HIGH CONSERVATION SIGNIFICANCE

CONSERVATION OPPORTUNITY AREAS

The Wisconsin Wildlife Action Plan Implementation (WDNR 2008) refined and focused the information in the 2005 plan by prioritizing the more than 1,700 conservation actions listed in the plan and identifying Conservation Opportunity Areas (COAs), specific places on the landscape where those actions can be implemented most effectively and efficiently. The Green Bay West Shores COA encompasses all of the plan area properties. This COA is considered to be of Global Significance due to its association with the shoreline of the Great Lakes, the largest freshwater lakes in the world and tremendous repositories of regionally rare biota and intact natural communities. The following Priority Conservation Actions apply to the GBPG properties:

- Protect and restore harbor and river mouth shoreline and wetland habitats.
- Preserve and maintain large expanses of sedge meadow, coastal fen and forested wetlands along the coast and manage in the context of a mosaic of community types.
- Improve regulations and increase education to prevent the introduction of additional exotic species and slow the spread of existing invasive species.
- Implement new cost-sharing programs and/or continue voluntary programs to monitor for and aggressively eliminate invasive species, especially in Great Lakes beach, dune, and ridge and swale communities.
- Maintain and connect large blocks of older floodplain forest to provide habitat for the large number of SGCN that use this habitat while addressing the regeneration difficulties associated with dense stands of reed canary grass.
- Initiate wetland renovation projects for Forster's tern and use artificial nest platforms to maintain existing Forster's tern populations.
- Maintain long-term wetland productivity on state properties by mimicking natural hydrologic regimes and using adaptive management techniques.

PRIMARY SITES

Primary Sites generally encompass the best examples of 1) both rare and representative natural communities and 2) rare species populations that have been documented to date within the GBPG. The significance of each Primary Site on the GBPG was evaluated according to the condition, quality, and extent of natural communities present; the number and size of the rare species populations; and the ecological context of these features. Sites with high or medium significance warrant high protection and/or restoration consideration during the development of the new property master plan. Sites of lower significance possess economic, recreation, and ecological values and may also deserve consideration for long-term restoration or other special management designation. All Primary Sites can be considered High Conservation Value Forests for the purpose of Forest Certification. Information on Primary Sites is meant to be considered along with other information when identifying opportunities for various management designations during the master planning process.

Six Primary Sites have been identified on the GBPG properties (WDNR 2010). Primary Site descriptions are included in the individual property descriptions below. Site names and significance are listed in Table 11.

Table 11. GBPG Primary Sites and Their Significance.

Site ID	Site Name	Significance
GBPG01	Peshtigo Harbor	High
GBPG02	Oconto Marsh	Medium
GBPG03	Pensaukee Marsh	Medium
GBPG04	Sensiba Wetlands	Low
GBPG05	Long Tail Point	Low
GBPG06	Duck Creek Delta	Medium

OPPORTUNITIES FOR BIODIVERSITY CONSERVATION

Extensive Coastal Wetlands

Though greatly diminished and degraded from their historical extent, the coastal wetlands along the west shore of Green Bay continue to be a productive and critical wetland resource, constituting approximately 50% of Lake Michigan's remaining wetlands. These wetlands provide important breeding and migratory stopover areas for waterbirds, spawning areas for fish, and support populations of rare plants and animals, including invertebrates. The GBPG properties encompass a significant amount of this acreage, and offer management opportunity for a variety of wetland types, including several extensive and high-quality examples.

Migratory Bird Stopover Habitat

The Great Lakes shoreline plays a crucial role for millions of migrating birds. The GBPG was identified as a high-quality Migratory Bird Stopover Site in a strategy to identify and protect migratory stopover habitats in the western Great Lakes (Grveles et al. 2011). The GBPG provides stopover habitat to up to 10,000 waterfowl, shorebirds, and other waterbirds; up to 1,000 raptors; and 10,000+ neo-tropical landbirds during the spring and fall migrations. Many factors contribute to the GBPG's ability to provide all of the resources (e.g., shelter, protection from predators, food, and water) needed for many individuals of numerous bird species to replenish fat reserves during migration. The location of the GBPG in a landscape dominated by agriculture and urban settings makes the remaining natural habitats, especially those with high structural diversity near water, very important foraging and perching opportunities.

Threats to Migratory Bird Stopover Sites and migratory birds include habitat destruction and habitat alteration (Duncan et al. 2002). Habitat alteration includes the simplification of forest structure or the alteration of forest composition, including invasive species that may change the kinds, quantity, and quality of food resources.

Fish Spawning Habitat

The coastal wetlands along the west shore of Green Bay have long been recognized for their importance to spawning fish (Brazner and Beals 1997; WDNR 2006a). The small perennial and interconnected streams and wetlands provide nursery areas for native fish such as Northern pike. Lake sturgeon spawn and recruit in the lower Peshtigo and Oconto Rivers. Juvenile lake sturgeon leave these rivers as fingerlings and spend most of their lives in Green Bay. These rivers are important in the restoration of lake sturgeon populations in Green Bay. Habitat restoration, fish stocking, and acquisition projects have been conducted to enhance habitat quality for spawning fish.

THREATS TO BIODIVERSITY CONSERVATION ON THE GBPG PROPERTIES

Hydrologic alteration, impaired water quality, development pressures, and invasive species are major threats to managing and protecting biodiversity on the plan area properties.

Many wetlands along the west shore of Green Bay already have been altered or lost due to conversion to agricultural use, dredge spoil disposal, stream channelization, road construction, and residential development. Residential and recreational developments (often with associated hydrological modifications such as ditching, diking, channelization, pond construction, and groundwater withdrawals) and infrastructure construction such as roads, power lines, culverts and ditches can disrupt hydrology, serve as a source of pollutants, facilitate the spread of invasive species, and act as physical barriers inhibiting or preventing the movements of some species. Development pressures

in the Green Bay watershed have created concerns over the viability of remaining wetlands and marshes (WDNR *in prep*).

Industrial and agricultural contamination and invasion by a host of non-native species have also effected significant changes in Green Bay aquatic communities. Lower Green Bay has been heavily impacted by industrial and municipal wastewater discharges and other pollutant sources, much of it entering via the Fox River at the City of Green Bay. Municipal sewage plants and industries prominent in the lower Fox River valley and the city of Green Bay discharged large quantities of wastes directly into Green Bay for many decades. Agricultural runoff also contributes to poor water quality. Water level fluctuations caused by short-term seiches in Green Bay can cause water levels in the Fox River to fluctuate, allowing nutrient- and silt-laden water to inundate lower Green Bay marshes (WDNR *in prep*).

Longer-term water level changes have dramatically affected the extent and quality of wetland vegetation. In the past, marsh vegetation in at least some parts of the Bay was reduced by as much as 90% during periods of high water. Water levels reached an historic high in 1986, and then dropped by 1.25 meters (4 feet), an historic low, during the period from 1997 to 2001. It was at this time that several invasive plants “exploded”, especially common reed (*Phragmites*), narrow-leaved cat-tail (*Typha angustifolia*), and hybrid cat-tail (*Typha x glauca*), and became the overwhelmingly dominant species in the west shore marshes, especially in lower Green Bay. This habitat simplification has reduced the numbers and diversity of wildlife species, especially birds, using the marshes (WDNR *in prep*).

Other problematic invasive species affecting wetland and aquatic communities include purple loosestrife, reed canary grass, European swamp thistle, Eurasian water-milfoil, rusty crayfish, round goby, zebra mussel, quagga mussel, spiny water flea, white perch, sea lamprey, alewife, and rainbow smelt. There are common carp in Green Bay as well as in the lower stretches of the Oconto, Peshtigo, and Pensaukee rivers (WDNR *in prep*).

Emerald ash borer (EAB), an exotic wood-boring beetle that kills native ash trees, is a serious threat to green ash and black ash in the floodplain forests and hardwood swamps of the plan area. EAB arrived in Wisconsin in 2008 and has since been confirmed in 13 counties, including Brown County. Brown County is one of 15 counties currently under quarantine to prevent the spread of EAB (DATCP 2012). Oaks are threatened by gypsy moth and oak wilt, which already are present on the GBPG properties.

CULTURAL RESOURCES

The shores and inland areas of Green Bay have a long history of human occupation. Native Americans traveled along the shoreline and on its rivers, utilizing the varied resources of the Bay and its adjacent woodlands. Missions and trading posts were established at several locations along the west shore, beginning during French settlement of the area in the 1700’s and continuing through British and American settlement period of the 1800’s and later. The region’s abundant timber was logged, with lumber mills

ANALYSIS OF THE PROPERTIES

located in Peshtigo, Oconto, and Pensaukee. The west shore supported a commercial fishing industry, which continues to this day on a much smaller scale.

Because of this long history of human occupation in the area, numerous historic properties (including both archaeological sites and historic structures) are known, although many more are yet to be discovered. Resources include prehistoric campsites and villages, burial areas of both Native Americans and Euro-American settlers, trading posts, lighthouses, shipwrecks, remnants of logging camps, and others. As for other areas of the state, cultural resource investigations along the west shore are ongoing. State Statutes (44.40) as well as Manual Code (1810.10) require that any activities with the potential to disturb archaeological sites will only be undertaken after consultation with the Department Archaeologist.

PROPERTY DESCRIPTIONS: HISTORY, RESOURCES, AND USE

BLOCH OXBOW STATE NATURAL AREA

Project Boundary:	N/A
Managed Land:	597.5 acres

PROPERTY DESCRIPTION

The Bloch Oxbow SNA is located on a level sandy upland a few feet above the floodplain of the Peshtigo River, two miles upstream from its confluence with Green Bay, in the Township of Peshtigo, Marinette County. It is adjacent to and northeast of the Peshtigo Harbor Unit of the Green Bay West Shore WA (Map C-1). This SNA protects one of the best remaining examples of Northern Dry-mesic Forest, a type formerly widespread in northeastern Wisconsin but now reduced to small, often degraded remnants. It also contains other upland and lowland forest types as well as small areas of grassland.

Acquisition at Bloch Oxbow began in 1990, with the purchase of 128 acres from the Bloch family for whom the property is named. Bloch Oxbow is SNA Number 234, and was designated in 1990.

Habitat and Vegetative Cover

The Northern Dry-mesic Forest is dominated by red oak and red maple in the canopy, with supercanopy white pines up to 36 inches DBH. Characteristic shrubs include hazelnut, witch hazel, huckleberry, blueberry and Northern wild-raisin, an uncommon species. Prevalent herbaceous plants are bracken fern, interrupted fern, Canada mayflower, wild sarsaparilla, and large-leaved aster. Bordering the Peshtigo River, at the extreme northeastern edge of its range in Wisconsin, is a Floodplain Forest. Dominants here include silver maple with green ash, elm, basswood, bitternut hickory, cottonwood, and black willow. Shrubs, emergent aquatics, and wet meadow vegetation, including sedges, rushes, and bluejoint grass, dominate the adjacent wetlands. Pockets of more mesic forest with hemlock and American beech are found in the southern portion of the site, while in the north is a xeric woodland dominated by Hill's, red, and white oaks, bigtooth aspen, and white, red, and jack pines. The groundlayer is primarily bracken fern with ericaceous species and Pennsylvania sedge. Widely scattered, very old charred stumps are evident in the area, possibly remnants from the historic Peshtigo Fire of 1871. Recent bank slumping along the river exposed another historical marker: the skeleton of an American bison, dated at 2,000 years in age. Bloch Oxbow provides critical habitat for several sensitive bird species including bald eagle, Caspian and Forster's terns, red-

shouldered hawk, and osprey. A great blue heron rookery and a large colony of bank swallows also are found here.

A breakdown of generalized cover types for Bloch Oxbow based on the Wisconsin Forest Inventory and Reporting System (WisFIRS) is given in Table 12. Cover types are shown on Map C-2.

Table 12. Bloch Oxbow SNA Cover Types.

Cover Type	% Cover
Bottomland Hardwood	34
Grassland	14
Oak	13
Swamp Conifer	3
Swamp Hardwoods	4
Upland Conifer	14
Upland Hardwood	5.5
Urban/Developed	1
Water	11

Primary Sites

Bloch Oxbow SNA is part of the 6,375-acre **Peshtigo Harbor Primary Site** (GBPG01). A full description of this Primary Site is provided in the Peshtigo Harbor Unit property description (p. 44).

Administrative Facilities and Access

The Department maintains three gravel parking areas along County Highway (CTH) BB, which traverses the property (Map C-3). There is no other infrastructure, nor maintained facilities, on this property.

Recreation

SNAs are open to cross-country skiing, fishing, hiking, hunting, trapping, wildlife viewing and nature study, and collecting of berries and other wild edibles. Bicycles, horses, ATVs and other vehicles, camping, campfires, and geocaching are not permitted.

The main recreational uses at Bloch Oxbow are hunting, fishing, wildlife viewing, and swimming. Bloch Oxbow is highlighted in the Great Wisconsin Birding and Nature Trail, Lake Michigan Region (WDNR 2006d) for waterfowl, songbirds, bald eagle, great blue heron, bank swallow, and red-shouldered hawk.

Current Management

The current management focus is to maintain the Northern Dry-mesic Forest and Floodplain Forest communities and maintain the property as an aquatic reserve and ecological reference area. The native species have been managed passively, allowing natural processes to determine the structure of the forests and wetlands. Open areas between patches of dry-mesic forest will be allowed to succeed to forest. Former agricultural fields on the property have been planted to a mix of native grasses and forbs. These fields are being managed to maintain them as grasslands. Other active management techniques include controlling invasive plants and animals and providing access to suppress wildfires.

Some current recreational uses of this property present management challenges. A sandbank located along a stretch of the Peshtigo River that traverses this property is a popular spot for swimming, fishing, and gatherings of local youth during the warm spring and summer months. Most of this use is during the day, but some occurs at night. Some activities (jumping off the sandbank into the water) can be hazardous and have resulted in injuries in the past. Others (littering, campfires, underage drinking) are illegal. Excessive use of the sandbank (running, climbing, jumping) can cause erosion. However, enforcement activity is limited by access.

GREEN BAY WEST SHORE WILDLIFE AREA

Project Boundary:	15,787 acres
Managed Land:	10,078 acres
Within boundary:	8,827
Outside boundary:	1,251

PROPERTY DESCRIPTION

The Green Bay West Shore (GBWS) WA is located on the west shore of Green Bay in Brown, Oconto, and Marinette counties (Map B). It consists of 11 separate, non-contiguous units scattered along the west shore, extending for approximately 42 miles from just south of Duck Creek in Brown County to the mouth of the Peshtigo River in Marinette County. Communities located near the WA include Green Bay, Howard, Suamico, Little Suamico, Pensaukee, Oconto, Peshtigo, and Marinette.

This is an area with abundant natural resources and a long history of human occupation, both by Native Americans and by a succession of European and Euro-American explorers, traders, missionaries, and immigrants. This is evidenced by a rich legacy of archaeological sites, including campsites, villages, burial areas, trading posts, and remnants of logging camps, among others, known from throughout the west shore. Native Americans, who may have inhabited the area as early as 7,000 BC, navigated along the rivers and shoreline and utilized the resources of the Bay and adjacent land. Abundant waterfowl and large game provided ample hunting opportunity. Productive wetlands, wild rice, spawning nurseries, and open-water forage habitat contributed to abundant fish populations and excellent fishing.

The first European explorer, Jean Nicolet, arrived in 1634. Shortly thereafter, the French laid claim to the area and made a profitable business out of trading furs with Native Americans. Missions and trading posts were established at several locations on the shore during this time. Various local place-names still echo their French origins today. The British took control of the area in 1763. Fur trading, centered at Green Bay, continued as the primary economic activity, peaking in the 1830s. In 1836 the Britain ceded the territory to the U.S. Government, which quickly surveyed the land and opened it up for sale. Euro-American immigrants began pouring into the area, creating new settlements and expanding existing population centers. Farming became established in the area, though poorly drained soils and water level fluctuations have always presented challenges for agriculture along the west shore.

Railroads arrived in the area in the 1860s, facilitating full exploitation of the region's abundant timber resources. By the late 1870s, the mouth of every log-producing river in the Green Bay region, including the Peshtigo, Oconto, and Pensaukee rivers, was lined with lumber mills. Fishing was also an important industry. At one time, Green Bay supported the largest commercial fishery in Wisconsin. This industry continues to this day, though at a much smaller scale.

The properties of the GBWS WA contain critically important wetland habitats that provide breeding and migratory stopover areas for many species of birds, spawning areas for fish, and support populations of rare plants and animals. Though greatly diminished from their historical extent, west shore coastal wetlands are rich and productive. They represent approximately 50% of all wetlands remaining on Lake Michigan, and therefore have high conservation value. The GBWS WA properties also represent an important recreational resource for the public, especially for the traditional outdoor pursuits of hunting, fishing, and trapping, but also for other nature-based activities such as boating, cross-country skiing, and wildlife viewing. The southernmost units of the GBWS WA, closer to Green Bay, receive greater pressure for human use, while the more northern units tend to have a wilder character. The habitats on these properties face continuing threats from development, disrupted hydrology, poor water quality, and invasive species.

Government involvement in the conservation of the west shore began in the 1930s with the establishment of a National Wildlife Refuge on Long Tail Point which was eventually terminated and turned over to the state for inclusion in the GBWS WA. Land acquisition by the state began in 1948 in the Sensiba Unit. Other units were established in 1954 (Peshtigo Harbor), 1956 (Pensaukee), 1962 (Rush Point), 1965 (Charles Pond) and 1967 (Oconto Marsh). In 1965, all the west shore properties in Marinette and Oconto Counties were placed under one project. In 1978, the project was expanded to include state acquisition of relevant properties within Brown County. Management has focused on wildlife habitat and wildlife-based recreation, with emphasis on waterfowl, wetland-dependent wildlife, migratory birds, and forest game species.

Because the shore zone is vitally important to the fish assemblage of Green Bay, land has been acquired under authority of the Scattered Fishery Habitat acquisition program. The GBWS WA properties have a hydrologic connection to the Bay and provide fish spawning and nursery habitat for a variety of fish species, particularly Northern pike. Protection of these sites and enhancement of fish habitat and spawning substrate are the primary fish management activities.

The 11 units of the GBWS WA are listed below by county, and each is described in more detail in the following sections.

Marinette County:

- Peshtigo Harbor Unit (4,812 acres)

Oconto County:

- Rush Point Unit (384 acres)
- Oconto Marsh Unit (927 acres)
- Pecor Point Unit (89 acres)
- Pensaukee Unit (515 acres)
- Charles Pond Unit (152.5 acres)

- Tibbett-Suamico Unit (308 acres)

Brown County:

- Little Tail Unit (243 acres)
- Sensiba Unit (637 acres)
- Long Tail Unit (317 acres)
- Peats Lake Unit (491 acres)

GREEN BAY WEST SHORE WILDLIFE AREA—PESHTIGO HARBOR UNIT

Project Boundary:	5,464 acres
Managed Land:	5,649 acres
Within boundary:	4,812
Outside boundary:	837

PROPERTY DESCRIPTION

The Peshtigo Harbor Unit is the northernmost and largest of all the Green Bay West Shore WA units. It is located approximately four miles south of the City of Peshtigo in the Township of Peshtigo, Marinette County. It lies at the mouth of the Peshtigo River and upstream along both sides (Map C-1). The Bloch Oxbow SNA is contiguous with this property to the northeast, and the Badger Gift Lands are contiguous to the north.

This area has a long history of human occupation. A village and sawmill once existed at the mouth of the Peshtigo River, and pilings from old wharfs are still visible in Green Bay. The lands of the wildlife area were once cultivated and the marshes mowed for hay. Prior to settlement and development by Europeans, the river, coastal wetlands, and adjoining uplands were heavily used by Native Americans.

Acquisition by the state in the Peshtigo Harbor Unit began in 1956 with a land trade between the Department and Marinette County. In 2001 and 2002, several large parcels along the Peshtigo River were gifted to the Department as part of a 2002 consent decree with the Fort James Operating Company (now Georgia Pacific). This decree was part of the Natural Resources Damage Assessment for the Fox River. Some of this acreage was within the project boundaries of Bloch Oxbow SNA and the Peshtigo Harbor Unit, and was incorporated into those two properties. The majority of the acreage (757 acres) is outside existing project boundaries, adjacent to and north of the Peshtigo Harbor Unit. This parcel is now known as the Badger Gift Lands (named for Badger Paper Mills, Inc., who formerly owned the land).

An 80-acre parcel located directly adjacent to Peshtigo Harbor’s southwest corner, which protects a stream corridor connected to Green Bay, has been acquired under authority of the Scattered Fishery Habitat program. Two SNAs, Peshtigo Harbor Lacustrine Forest and Peshtigo River Delta Marshes, were designated within the Peshtigo Harbor Unit in 2008.

Habitat and Vegetative Cover

Extensive emergent marshes and sedge meadows are found around the mouth of the Peshtigo River. Upstream along the river are bottomland hardwoods at the extreme northeastern edge of their range in Wisconsin. Stands of swamp hardwoods also occur along the river. Slightly more than half the property is vegetated with a mixture of oak,

aspen, and red maple. Native and restored warm-season grasslands are maintained on the property. Table 13 provides a breakdown of generalized cover types. Cover types are shown on Map C-2. Additional detail on Peshtigo Harbor’s vegetative communities is provided in the SNA and Primary Site descriptions below.

Spawning opportunities for lake sturgeon exist on this property and could be developed further.

Table 13. Peshtigo Harbor Unit Cover Types.

Cover Type	% Cover
Aspen	7
Bottomland Hardwood	2
Emergent Vegetation	10
Grassland	3
Lowland Shrub	42
Oak	3.5
Open Water	4
Swamp Hardwood	14
Upland Conifer	<1
Upland Hardwood	12
Urban/Developed	<1
Wetland-Non Forested	<1

State Natural Areas

The Peshtigo Harbor Unit contains two embedded SNAs (Map C-1). The **Peshtigo Harbor Lacustrine Forest** represents one of the least disturbed and best remaining examples of the hardwood swamps that formerly dominated this area along the west shore of Green Bay. Large-diameter green ash (up to 28 inches DBH) and red maple (up to 34 inches DBH) dominate the fairly dense canopy. The ground and shrub layers are intact with virtually no invasive species present. Species include maple-leaved viburnum, mountain holly, alder, impatiens, fowl manna grass, blue-joint grass, brome-like sedge, sensitive fern, northern bedstraw, American starflower, naked miterwort, and maidenhair fern. Bird life is varied and includes the state-threatened cerulean warbler. Other breeding birds include pileated woodpecker, Eastern wood-pewee, least flycatcher, veery, ovenbird, American redstart, Canada warbler, and scarlet tanager. This SNA is managed as a Southern Hardwood Swamp, an aquatic preserve, a wetland protection site, and an ecological reference area. Management is primarily passive, allowing natural processes to determine the ecological characteristics of the site, with exceptions for invasive species control and access to suppress wildfires. Peshtigo Harbor Lacustrine Forest is SNA Number 562 and was designated 2008.

The **Peshtigo River Delta Marshes** is an extensive sedge meadow and marsh complex bordering the mouth of the Peshtigo River. It supports a willow and dogwood Shrub-

Carr that becomes more open toward its southern end where the quality Southern Sedge Meadow is found. Tussock sedge and bluejoint grass dominate the meadow, with cordgrass, marsh fern, sensitive fern, northern tick-seed sunflower, spotted Joe-pye weed, orange jewelweed, turtlehead, marsh cinquefoil, blue skullcap, and marsh bellflower also present. Slender willow dominates the shrub layer, which also contains alder, red-osier dogwood, and white meadowsweet. Osprey and American bittern are known from the surrounding area. This SNA is managed as a Southern Sedge Meadow, an aquatic preserve, a wetland protection site, and an ecological reference area. Management activities include control of woody vegetation through tree harvest, brushing, and fire to mimic natural disturbance, as well as invasive species control and access to suppress wildfires. Peshtigo River Delta Marshes is SNA Number 563 and was designated in 2008.

Primary Sites

Peshtigo Harbor – 6,375 acres (GBPG01)

This site is a large wetland complex that includes Bloch Oxbow SNA, Peshtigo Harbor Lacustrine Forest SNA, and Peshtigo River Delta Marshes SNA (Map C-4). The wetland extends upstream for two miles from the mouth of the Peshtigo River. A variety of natural communities and habitat features occur here, including Emergent Marsh, Southern Sedge Meadow, Shrub-carr, Floodplain Forest, abandoned oxbow lakes, beach, sand bar, and channels within the river delta. The lower two miles of the river form an extensive delta, with river channels winding through large stands of good-quality Emergent Marsh and Southern Sedge Meadow.

This site receives high use by migrating birds and is considered to be a highly important migratory stopover site (Grveles et al. 2011). The Peshtigo River and its associated bottomland forest, open marshes and wetlands are rare elsewhere in the local landscape, and provide a good prey base to support high numbers of both migrating and resident diurnal raptors such as bald eagle, red-shouldered hawk, osprey, and northern harrier. This site likely contains the most diverse and least disturbed wetland complex on the west shore of Green Bay. Its large size, diverse mosaic of wetland communities, good overall condition of the vegetation, and presence of many rare resident and migratory bird species all contribute to the site's high significance.

Administrative Facilities and Access

The Peshtigo Harbor Unit can be accessed from either side of the Peshtigo River. Harbor Road, Hale School Road, and Spitzmacher Road provide access from the south side of the river, and CTH BB provides access from the north side.

The Peshtigo Harbor Unit has the most infrastructure of all the plan area properties (Map C-3). The Department maintains 22 parking areas, many of them along Harbor Road, which traverses the property from northwest to southeast. A boat landing on CTH BB provides access to the Peshtigo River upstream from the mouth on the north side.

Another boat landing at the mouth of the Peshtigo River on the south side provides access to the river and to Green Bay. There is an access to Winegar Pond, a bay at the mouth of the Peshtigo River, which can be used to launch small boats when water levels in Green Bay allow. This access is located on Pond Road.

Two areas along Harbor Road in the northern portion of the property have been designated as Class 2 dog training areas. A 460-acre waterfowl closed area is located along the Peshtigo River near its mouth.

There are two service roads used for management access to the property. One, known as the “dike road” or “Birding Trail”, extends west and south off Harbor Road for approximately a half-mile and ends at a parking area. The second, Woods Road, traverses the property for approximately 1.5 miles between Hale School Road and Spitzmacher Road in the far western portion of the property. Both are gated but are opened for public use during some portions of the year.

A network of unimproved woods trails connected to Woods Road has been used to develop the Woods Road Ski Trail. This is a ungroomed cross-country skiing, snowshoeing, and hiking trail that was developed in partnership between WDNR, Marinette County Land and Water Conservation, and UW-Extension, with funding from the Wisconsin Coastal Management Program (The Peshtigo River Trail and Hemlock Curve Trail, described below, also were developed as part of this effort). The 6-mile trail was completed in 2006 and features various loop options. Nine interpretive stations located along the trail provide information on the various wildlife species that use the area. Trail brochures are available at the trailhead and on the trail at boxes placed at intersections.

An observation platform in the property’s far eastern corner overlooks Winegar Pond. It was completed in 2012 through the efforts of the Chappee Rapids Audubon Society out of Marinette. The platform, which can be accessed from Pond Road, provides viewing opportunities for both water birds and forest birds. This is a particularly good site during migration as birds travel along the Bay and concentrate in the area.

A self-guided interpretive water trail, known as the Peshtigo River Trail, has been established on the Peshtigo River. The trail was completed in 2004 and is 11 miles long. It begins at the boat launch in the City of Peshtigo and follows the river through the Badger Gift Lands and Peshtigo Harbor Unit. A brochure available at the launch provides interpretive information about features of the river, which are marked along the trail by numbered wooden posts.

The Badger Gift Lands parcel has a trail and a shooting range. The Hemlock Curve Trail, completed in 2005, is located off Badger Road. It is a 2.4-mile interpretive walking trail with two loop options that takes users through fields and forest stands along the Peshtigo River. A trail guide available at the trailhead provides information about nature stops along the way. The trail also is open to cross-country skiing and snow-shoeing, though not groomed. There is also a shooting range, located near the end of Badger Road. The

range was developed by a group of employees at Badger Paper Mills, Inc., when the land was owned by that company. They maintained the site for recreational and competitive shooting. Two sets of shooting stands currently exist on the site, and target backstops allow shooting at ranges from 25 to 100 yards with an additional backstop approximately 250 yards from one of the shooting stands. Proposed renovations of the range involve relocating some shooting stands, further developing the target backstops, and developing side berms.

Recreation

The major recreational uses of this property are hunting, fishing, trapping, dog training, cross-country skiing, canoeing, and wildlife viewing. The area is a popular destination for deer, small game, and waterfowl hunting. Trappers pursue furbearers, mostly mink, weasel, and muskrat but also some coyote and fox, particularly in the coastal marshes at the mouth of the river.

The Peshtigo River is a relatively popular canoe destination during the warm months. The Woods Road Trail is frequented by hikers, dog-walkers, cross-country skiers, and snow-shoers. It receives daily use when conditions are appropriate.

Birding has increased in popularity in recent years. The Peshtigo Harbor Unit is highlighted in the Great Wisconsin Birding and Nature Trail, Lake Michigan Region (WDNR 2006d) for waterfowl, terns, rails, bitterns, Northern harrier, and sparrows.

Current Management

Currently, wetland, grassland, and forest management are all important activities on the Peshtigo Harbor Unit, with the goal of maintaining a diverse mix of game and nongame wildlife species.

Prescribed fire is used regularly to maintain and to control woody invasion in both planted and natural grasslands as well as in wetland habitats. Most of the grassland areas, as well as some large sedge meadows, are located along Harbor Road. Upland fields are a mix of native warm-season grasses and restored warm-season fields on former cultivated land.

An active forestry program maintains a variety of forest types on the property. Bottomland and swamp hardwoods receive primarily even-aged management with periodic thinnings and some uneven-aged management (group selection) to maintain age class diversity. The Peshtigo Harbor Lacustrine Forest SNA serves as an ecological reference for the area. Oak and aspen are maintained through even-aged management. A 1,500-acre Demonstration Area for the Upper Great Lakes Young Forest Initiative was established on the property in 2012. It is located between Woods Road and Harbor Road, and is managed using commercial and non-commercial forestry practices and other vegetation management activities, including prescribed burns, alder shearing, and management to control invasives.

Common, glossy, and hybrid buckthorns, reed canary grass, purple loosestrife, spotted knapweed, and *Phragmites* are all problematic invasives on Peshtigo Harbor. A variety of techniques are employed to control infestations of these species, including cutting and stump-treating, prescribed burns, herbicide application, and bio-control. Stands of *Phragmites* have been treated by aerial herbicide spraying as part of a Great Lakes Restoration Initiative (GLRI)-funded control effort along the entire west shore during 2011 and 2012.

GREEN BAY WEST SHORE WILDLIFE AREA—RUSH POINT UNIT

Project Boundary:	946 acres
Managed Land:	398 acres
Within boundary:	384
Outside boundary:	14

PROPERTY DESCRIPTION

The Rush Point Unit of the Green Bay West Shore WA is located approximately seven miles northeast of the City of Oconto in Oconto County (Map D-1).

This Unit was established in 1962. Some of the land within the current Rush Point project boundary was farmed at one time, but poor soils and a high water table make this area marginal for agriculture.

Habitat and Vegetative Cover

Rush Point hosts a variety of habitat types, ranging from coastal marshes along the shore of Green Bay to mature swamp hardwoods. Lowland brush communities occur throughout the property, as well as scattered stands of aspen. A breakdown of major habitat types is shown in Table 14. Cover types are shown on Map D-2.

Thomas Slough flows through the Rush Point Unit and into Green Bay. This watercourse drains and provides access to the County Line Swamp, an extensive mosaic of forested and open wetlands on mostly county-owned lands located on both sides of the Marinette-Oconto county line. This is an important connection to Green Bay as fish populations in the Bay are dependent on coastal wetlands for spawning and nursery habitat.

Table 14. Rush Point Unit Cover Types.

Cover Type	% Cover
Aspen	21.5
Emergent Vegetation	2.5
Grassland	6
Lowland Shrub	16
Shrub	<1
Swamp Conifer	<1
Swamp Hardwood	51
Wetland Non-forested	2

Administrative Facilities and Access

This property can be accessed from CTHs Y and A. There are no parking areas or other infrastructure maintained on the property (Map D-3).

Recreation

The main recreational uses at Rush Point are hunting, fishing, and trapping. Hunting is especially notable for deer and small game. The unit provides access to the Bay where waterfowl hunting is available. Some fishing takes place where Thomas Slough crosses CTH Y. Other permitted uses include berry-picking, and wildlife viewing.

Birding is increasing in popularity. The Rush Point Unit is featured as part of the Oconto Marsh waypoint in the Great Wisconsin Birding and Nature Trail, Lake Michigan Region for waterfowl, pelicans, and terns.

Current Management

Forest stands in this unit are managed using sustainable forestry practices to maintain a diverse mix of size and age classes. Stands of alder are mowed to create and maintain habitat for woodcock. The shoreline portion of the property has received aerial herbicide spraying to control *Phragmites* as part of a GLRI-funded control effort along the entire west shore.

GREEN BAY WEST SHORE WILDLIFE AREA—OCONTO MARSH UNIT

Project Boundary:	1,455 acres
Managed Land:	931 acres
Inside boundary:	927
Outside boundary:	4

PROPERTY DESCRIPTION

The Oconto Marsh Unit is located approximately one mile northeast of the City of Oconto in Oconto County (Map E-1). The marsh is an important stopover area for migrating waterfowl and other wetland-dependent birds and a very productive breeding area for dabbling ducks.

The Unit was established in 1967. In 1965, the Oconto County Sportsmen’s Club transferred 254 acres of land within the city limits of the City of Oconto to the Department. This land became part of the Oconto Marsh Unit. In accordance with the terms of the transfer, an impoundment was created, a pump installed, and a waterfowl refuge established on the transferred acres in 1969. These improvements, completed in 1969, are required to remain in place for a 50-year period according to the terms of the transfer.

Habitat and Vegetative Cover

The 220-acre impoundment in the southern portion of the property contains emergent marsh, lowland shrubs, and open water. Surrounding this area are coastal wetlands consisting of sedge meadow and shrub-carr. In the central and northern portions of the property, bottomland hardwoods and swamp hardwoods are interspersed with wet openings along the edges of the coastal wetlands. There also are areas of aspen. Table 15 gives a list of cover types. Cover types are shown on Map E-2.

Additional details on the vegetative communities on Oconto Marsh are provided in the description of the Primary Site below.

Table 15. Oconto Marsh Unit Cover Types.

Cover Type	% Cover
Agriculture	<1
Aspen	18
Bottomland Hardwood	3
Emergent Vegetation	29.5
Lowland Shrub	16
Shrub	1
Swamp Hardwood	31
Wetland-Non-Forested	1

Primary Sites

Oconto Marsh – 918 acres (GBPG02)

Oconto Marsh is within one of the largest wetlands along the western shoreline of lower Green Bay north of the Oconto River mouth (Map E-4). Most of the wetland is a complex of Southern Sedge Meadow and Emergent Marsh, though Shrub-carr is also present in association with these communities. Patches of Southern Hardwood Forest are also present further inland.

The marsh is an important breeding area for birds. It is important to many species that have been forced to abandon former habitat in the southern part of the bay because of high water levels, wetland filling, and pollutants. Oconto Marsh also receives significant use from migrating waterfowl and shorebirds. It is a high-quality site that provides shelter and protection from predation and may contain habitat niches that provide unique or rare resources to specialized species (Grveles et al. 2011).

This site is adversely affected by poor water quality in Green Bay, as well as by point and nonpoint pollution discharges into the Oconto River. The shoreline of Green Bay is developed and development pressure exists to the west of the site. Tern nesting activity in this area has declined substantially, possibly due to water level fluctuations and competition with ring-billed gulls. Management considerations include continued work to improve water quality and to control invasive species. Declines in rare species populations at this site should be monitored and habitat restoration work continued.

Administrative Facilities and Access

The main access to the Oconto Marsh Unit is along CTH Y. The Department maintains a parking area on CTH Y in the southern portion of the property and has plans to add another off Red Cedar Road in the north (Map E-3).

A pump and two water control structures are used to manage water levels in the impoundment. A waterfowl closed area has been established on the entire impoundment to provide a resting area for waterfowl during the fall migration period. No hunting or trapping is allowed within the impounded area during periods when waterfowl hunting seasons are open.

Recreation

The main recreational uses at Oconto Marsh are hunting, fishing, and trapping. Hunting is especially notable for deer and upland game. Other permitted uses include berry-picking and wildlife viewing. The dike on the impoundment is used by hikers and cross-country skiers. Construction began on an observation platform on the impoundment dike in 2012 in cooperation with the Oconto Promise, a local youth/adult partnership. The platform is scheduled to be completed in early 2013. Educational materials and programs about the marsh have been developed and presented and a local educator's class

maintains a website about the marsh. Oconto Marsh also is featured in the Great Wisconsin Birding and Nature Trail, Lake Michigan Region for waterfowl, cranes, rails, and terns.

Current Management

Water level control and vegetation management of the marsh provides habitat for wetland-dependent wildlife and opportunities for hunting and trapping. Water levels are controlled by means of the pump and the water control structures on the north dike of the impoundment. Periodically, the marsh vegetation is managed with mowing or prescribed fire to control woody invasion. Timber management is applied using sustainable forestry practices on upland portions of the unit to enhance opportunities for deer and small game hunting. Timber sales and lowland brush management are used to maintain early-successional forest types on this unit.

Biological control of purple loosestrife has been employed within this unit. Areas within the marsh have been treated with herbicide to control *Phragmites* and glossy buckthorn.

GREEN BAY WEST SHORE WILDLIFE AREA—PECOR POINT UNIT

Project Boundary:	751 acres
Managed Land:	137 acres
Inside boundary:	89
Outside boundary:	48

PROPERTY DESCRIPTION

The Pecor Point Unit is located approximately two miles northeast of the Town of Pensaukee in Oconto County (Map F-1).

This unit was established in 1981. The Department-owned Beaver Meadow fish spawning area and a Department of Transportation (DOT)-owned wetland mitigation site are adjacent to the Pecor Point Unit. These sites contain similar wetland habitats and add complementary management opportunities to the Pecor Point property.

Habitat and Vegetative Cover

Pecor Point is predominantly shrub-carr and sedge meadow. There are areas of swamp hardwoods and upland hardwoods on the southernmost parcel of the Unit. The Beaver Meadow spawning marsh contains lowland brush and wet meadow habitat. This site has a water control structure which is open in the spring to allow for fish passage and closed in the summer and fall to hold water on the site. The DOT mitigation site has emergent marsh grading into wet meadow and lowland brush. Water control structures on the DOT site allow water to flow either into the marsh or through a Northern pike spawning area that runs adjacent to Pecor Point Lane. Table 16 contains a breakdown of general cover types. Cover types are shown on Map F-2.

Table 16. Pecor Point Unit Cover Types.

Cover Type	% Cover
Emergent Vegetation	24
Grassland	6
Lowland Shrub	11
Open Water	<1
Shrub	12.5
Swamp Hardwood	16
Upland Conifer	2
Upland Hardwood	17
Wetland-Non-Forested	10

Administrative Facilities and Access

Access to the property is along CTH S and Pecor Point Lane (Map F-3). There is a small gravel parking area on Pecor Point Lane close to the intersection with Dittman Lane that serves the Beaver Meadow spawning marsh. The end of Pecor Point Lane is used by waterfowl hunters as an access point to Green Bay, but this access has been greatly reduced by low water levels and an infestation of *Phragmites*.

Recreation

The main recreational uses at Pecor Point are hunting, fishing, and trapping. Hunting is especially notable for deer, waterfowl, and upland game. Other permitted uses include berry-picking, and wildlife viewing.

Current Management

The Pecor Point Unit, Beaver Meadow spawning marsh, and the DOT mitigation site are managed for wetland wildlife and for Northern pike spawning and nursery habitat. Invasive species control, primarily for *Phragmites* and glossy buckthorn, and maintenance of fish passage are the main management activities. Prescribed burns have been conducted on marsh vegetation at the DOT site and Beaver Meadow to enhance waterfowl nesting opportunities in the area. Swamp and upland hardwoods are maintained using sustainable forestry practices.

GREEN BAY WEST SHORE WILDLIFE AREA—PENSAUKEE UNIT

Project Boundary:	604 acres
Managed Land:	515 acres
Inside boundary:	515
Outside boundary:	0

PROPERTY DESCRIPTION

The Pensaukee Unit is located along both sides of CTH S just south of the Town of Pensaukee in Oconto County (Map G-1).

The Pensaukee Unit was established in 1956. Potholes for waterfowl use were developed in the coastal marsh. Dredge spoil islands off the property were important breeding areas for Green Bay colonial nesting birds during high water years but recent low water levels have reduced the use of these areas. Spawning opportunities for Northern pike exist on this property and could be developed further.

Habitat and Vegetative Cover

A large coastal marsh dominates the portion of the property east of CTH S, with sedges, emergent vegetation, shrub carr, and bottomland hardwoods. There also is a native grass field. West of CTH S, ridges forested with oak are interspersed with swamp hardwoods, shrub-carr, and marsh. Table 17 gives a breakdown of cover types present on the property. Cover types are shown on Map G-2.

Additional details on the vegetative cover types on Pensaukee are provided in the description of the Primary Site below.

Table 17. Pensaukee Unit Cover Types.

Cover Type	% Cover
Bottomland Hardwood	4
Emergent Vegetation	34.5
Grassland	3
Lowland Shrub	22
Oak	7
Open Water	<1
Swamp Hardwood	23
Upland Brush	3
Upland Hardwood	<1
Urban/Developed	3

Primary Sites

Pensaukee Marsh – 621 acres (GBPG03)

The Pensaukee Marsh is located on a sandy lake plain near the mouth of the Pensaukee River in Oconto County (Map G-4). Along the bay, Emergent Marsh is dominated by soft-stem bulrush, rushes, and rice cut grass. To the west is a low-quality Shrub-carr and Southern Sedge Meadow complex dominated by reed canary grass, common reed grass (*Phragmites*), and cat-tails. On a remnant Pleistocene sandy beach ridge is a Hill's oak-dominated forest (currently typed as a Great Lakes Barrens) that provides habitat for the rare crinkled hair grass (*Deschampia flexuosa*).

Pensaukee Marsh has been recognized as an important spawning area for Northern pike. In 2008 restoration work was conducted to remove a berm that channeled water directly into the bay. This enhanced available habitat and allowed water from wetlands upstream to flow through the marsh, which allows sediment and nutrients to be filtered before entering Green Bay.

This site has some value as a resting and refueling site for migratory birds as they move on to higher quality sites (Grveles et al. 2011). Overall the site provides diverse habitat for a wide range of songbirds, gulls, terns, shorebirds, invertebrates, plants, and spawning fish. The Great Lakes Barrens natural community is a globally rare type that is found in very few places in Wisconsin and has limited opportunities outside of known sites. Management opportunities at this site include restoring the Great Lakes Barrens as well as other areas that provide habitat for rare species and spawning fish.

Administrative Facilities and Access

CTH S traverses the entire Pensaukee Unit and provides the main access route (Map G-3). The Department maintains three parking areas on the property, two along CTH S and one along a short access road in the southeast corner of the property. A boat access site associated with this third parking area provides access to Lake Michigan. This boat launch is unimproved and suitable only for small boats or skiffs. Current water levels in Green Bay have reduced its utility.

Recreation

The main recreational uses at Pensaukee are hunting, fishing, and trapping. Deer, turkey, upland game, and waterfowl are all hunted on this property. Pheasants are stocked on this property in cooperation with local sportsmen's groups in some years.

Other permitted uses include berry-picking, and wildlife viewing. Birding is increasing in popularity. The Pensaukee Unit is featured in the Great Wisconsin Birding and Nature Trail, Lake Michigan Region for herons, bitterns, rails, other wetland birds, and diving ducks.

Current Management

Today, the native grasses have been managed through the use of prescribed fire to provide nesting cover for waterfowl and grassland birds. Pheasants are stocked on Pensaukee in some years by local sportsmen’s clubs participating in the Department’s Day-old Chick Program. Timber sales on the unit have maintained and enhanced habitat for forest wildlife, particularly for the many species benefitting from oak. A recent project to remove dredge spoils from the marsh has created better conditions for fish spawning and for waterfowl by removing a dredge spoil bank that was channeling water directly through to Green Bay. This widened a watercourse flowing through the marsh and now allows seasonal water flows to spread through the emergent wetlands rather than run straight to the Bay. The shoreline of the Pensaukee Unit has been treated to control *Phragmites* as part of a GLRI-funded control effort along the entire west shore.

GREEN BAY WEST SHORE WILDLIFE AREA—CHARLES POND UNIT

Project Boundary:	106 acres
Managed Land:	152.5 acres
Inside boundary:	103.5
Outside boundary:	49

PROPERTY DESCRIPTION

The entire Charles Pond unit consists of the Charles Pond SNA. It is located along CTH S approximately five miles south of the Town of Pensaukee in Oconto County (Map H-1).

The Charles Pond Unit was acquired in 1965. Portions of the unit were purchased under Wildlife Area authority and portions under State Natural Area authority. Management on the Unit is consistent with both designations. Charles Pond formerly was a baymouth bar lake with a narrow outlet to Green Bay, surrounded by extensive shrub-carr and shallow marsh. West of the pond was a well-developed lacustrine hardwood forest, but high water levels during the 1980's obliterated all of the marshland and a large portion of the forest. The remainder of the site is affected by Green Bay seiches, tide-like rising and falling of lake water due to wind action. The main value of the site now is for monitoring long-term geological processes and the effects of the fluctuating water levels of Green Bay.

Charles Pond is SNA Number 39 and was designated in 1965.

Habitat and Vegetative Cover

The lacustrine forest near the shore consists of mature basswood, maples, and ash. There are areas of central hardwoods and red maple in the uplands. The character of site changes depending on water levels in Green Bay. When water levels are high, Charles Pond becomes a small bay. During periods of low water, a shallow-water marsh may develop. Much of the shoreline contains the invasive common reed (*Phragmites*). A breakdown of cover types is given in Table 18. Cover types are shown on Map H-2.

Table 18. Charles Pond Unit Cover Types.

Cover Type	% Cover
Emergent Vegetation	30
Lowland Brush	10
Lowland Shrub	<1
Open Water	23
Swamp Hardwood	37

Administrative Facilities and Access

Access to this property is poor. CTH S touches a corner of the property, and walk-in access is available here. There are no parking areas or other maintained infrastructure on this property (Map H-3).

Recreation

The main recreational uses at Charles Pond are hunting, fishing, and trapping. Deer is the main species hunted, but waterfowl and small game hunters make some use of the property.

SNAs also are open to cross-country skiing, hiking, hunting, wildlife viewing and nature study, and collecting of berries and other wild edibles. Bicycles, horses, ATVs and other vehicles, camping, campfires, and geocaching are not permitted.

Current Management

The current management focus for this property is to maintain the site as a reserve for the baymouth bar geological feature and to monitor the effects of fluctuating water levels. The native aquatic species have been managed passively, allowing natural ecological process to determine their composition and structure. The inundated marsh area may develop its own flora and fauna. Future erosion and deposition will depend on lake levels and the location of long-shore currents. Current active management includes control of invasive species and access to suppress wildfires.

GREEN BAY WEST SHORE WILDLIFE AREA—TIBBET-SUAMICO UNIT

Project Boundary:	1,812 acres
Managed Land:	387 acres
Inside boundary:	308
Outside boundary:	79

PROPERTY DESCRIPTION

The Tibbet-Suamico Unit is located approximately one mile east of the Town of Little Suamico in Oconto County (Map I-1). The largest of the two parcels within this Unit is south of Lade Beach Road and west of Rost Road, and the second, smaller, parcel is south of Rost Road.

The Tibbet-Suamico Unit was established in 1994, the last of the 11 units of the GBWS WA to be established. Additional land was purchased here in 2005. The property provides important habitat for resident and migrating birds.

Two Statewide Habitat Area parcels are located outside the project boundary near the southern edge of this Unit, close to the Oconto-Brown county line. The southernmost parcel, purchased in 2003, is 45 acres in size and located NW of the intersection of Brown Road and Bayside Road. Just north of this is the second parcel, acquired in 2006. It is 30 acres in size and is located at the terminus of Bayside Road, where there is a short foot-travel-only easement. Both were purchased to protect fish spawning habitat. During spawning, Northern pike migrate from the Bay to utilize the small stream that bisects the northern parcel, while the southern parcel borders a ditch that pike use for navigation to spawning grounds farther inland.

Habitat and Vegetative Cover

This Unit is comprised of emergent vegetation, shrub carr, black ash swamp, and areas of aspen and mature maple-basswood forest. Much of the shoreline consists of the invasive common reed (*Phragmites*). Table 19 provides a breakdown of cover types. Cover types are shown on Map I-2.

There is potential on this property to improve habitat for waterfowl and Northern pike by creating shallow scrapes and utilizing the existing ditch on the south end of the Ball Park Road parcel to improve fish passage to spawning grounds farther inland.

The southernmost Statewide Habitat Area parcel is an oldfield currently succeeding to shrub-carr, and the northern parcel is mostly shrub-carr with a small amount of emergent vegetation and some upland hardwoods.

Table 19. Tibbet-Suamico Unit Cover Types.

Cover Type	% Cover
Aspen	5
Emergent Vegetation	18
Grassland	11
Lowland Shrub	13.5
Open Water	8
Shrub	5
Swamp Hardwood	22
Upland Hardwood	17
Wetland-Non-Forested	<1

Administrative Facilities and Access

The northernmost parcel within this Unit can be accessed from Lade Beach Road, where the Department maintains a small gravel parking area (Map I-3). Waterfowl hunters access the Bay and shoreline frontage on the Unit from the end of Lade Beach Road. A foot-travel-only easement extends east from the intersection of Ball Park Road and Grosse Road to the Unit’s southern parcel, providing access. A stipulation of the easement prohibits hunting on the easement.

The two Statewide Habitat Area parcels can be accessed from Brown Road and Bayside Road. The nearest parking for both these parcels is a parking area on the northernmost parcel of the Little Tail Unit, just southeast of the intersection of Brown Road and Bayside Road.

Recreation

The main recreational uses at Tibbet-Suamico are hunting, fishing, and trapping. Hunting is notable for deer, turkey, waterfowl, and small game. Other permitted uses include berry-picking, and wildlife viewing.

Current Management

Sustainable forestry practices are used to maintain current timber types on the property and to enhance habitat for forest wildlife. Wetlands management consists largely of controlling invasive species, chiefly *Phragmites* and buckthorn. The Statewide Habitat Area parcels are managed to maintain and enhance fish spawning habitat.

GREEN BAY WEST SHORE WILDLIFE AREA—LITTLE TAIL UNIT

Project Boundary:	591 acres
Managed Land:	243 acres
Inside boundary:	243
Outside boundary:	0

PROPERTY DESCRIPTION

The Little Tail Unit is located approximately three miles north of the Village of Suamico in Brown County, between Brown Road East and Norfield Road and east of Bayside Road (Map J-1).

The Little Tail Unit was established in 1979. Land acquisition has continued, with the most recent purchase occurring in 2001. Little Tail Point currently is owned by a sportsman’s club that uses the land primarily for deer and waterfowl hunting.

Landscaping activities which occurred in the northwest corner of the property during private ownership created shallow scrapes which have now developed wetland characteristics.

Habitat and Vegetative Cover

Most of this property is dominated by sedge meadow and shrub-carr. There are scattered small areas of mixed lowland hardwoods and one larger tract adjacent to a former agricultural field, now succeeded to shrubs, in the northwest corner of the property. A breakdown of cover types is provided in Table 20. Cover types are shown on Map J-2.

Two drainage ditches on the property have the potential to provide passage for Northern pike to existing spawning grounds. Creation of shallow scrapes would provide additional spawning habitat as well as shallow-water habitat for waterfowl.

Problematic invasives on the property include common reed (*Phragmites*), glossy buckthorn, and reed canary grass.

Table 20. Little Tail Unit Cover Types.

Cover Type	% Cover
Agriculture	<1
Bottomland Hardwood	21
Emergent Vegetation	15
Grassland	16
Lowland Shrub	14.5
Open Water	<1

Cover Type	% Cover
Upland Conifer	<1
Wetland-Non-Forested	31

Administrative Facilities and Access

The Little Tail Unit can be accessed along Brown Road East, Bayside Road, and Hook Road. Two small gravel parking areas were added in 2012 to improve access. One is on the east side of Bayside Road near its intersection with Brown Road, and the second is on the south side of Hook Road near its intersection with Bayside Road (Map J-3).

Recreation

The main recreational uses at Little Tail are hunting and trapping. Hunting is notable for deer, turkey, and small game in the uplands and waterfowl along the shoreline. Trappers pursue wetland-associated furbearers as opportunity permits. Muskrat trapping can be good during periods of higher water when production is higher.

Other recreational uses are restricted by the lowland vegetation which dominates the property. Only upland areas are accessible throughout the year. The wetland areas are only accessible during the winter.

Current Management

Current management at Little Tail focuses on protecting and maintaining the wetland communities and associated species while controlling invasives and providing opportunities for hunting, fishing, and trapping.

The sheltered wetlands on Little Tail provide spawning habitat for yellow perch and Northern pike. The Brown County Land and Water Conservation Department made habitat improvements in 2012 to a ditch that runs along the northern border of the property, along Brown Road, and west onto private lands that offer additional Northern pike spawning habitat. However, there are no water manipulation opportunities on Little Tail, and successful spawning depends on natural precipitation and water level fluctuations to create the flooding and water movement necessary to transport fish inland.

Management of the wetlands is largely passive. Long-term fluctuating water levels of the Bay strongly affect vegetation structure in the wetlands. Periods of higher water favor open wetlands, while low water years tend to shift the community towards shrub swamp.

Forest stands are actively managed using sustainable forestry techniques. The oldfields in the northwest corner have currently succeeded to shrub-carr. Various restoration options are being considered. *Phragmites* was treated by aerial herbicide spraying in 2011 and 2012 as part of a GLRI-funded control effort along the entire west shore.

GREEN BAY WEST SHORE WILDLIFE AREA—SENSIBA UNIT

Project Boundary:	899 acres
Managed Land:	774 acres
Inside boundary:	637
Outside boundary:	137

PROPERTY DESCRIPTION

The Sensiba Unit is located approximately one mile east of the Village of Suamico in Brown County, north of the Suamico River, between Resort Road and Sunset Beach Road (Map K-1). Only ten miles north of the City of Green Bay, Sensiba is in close proximity to this large populated area. There are various residential developments near the property, including immediately adjacent to the south and east.

Sensiba was the first of the GBWS WA units to be established. The first parcel, totaling 450 acres, was purchased in 1948 from Lucille Sensiba, for whom the unit is named. Much of the property was unsuitable for farming and has remained forested for the past two centuries. In 1959, in an effort to create waterfowl habitat, a one-mile dike was constructed along the shoreline of the property, creating a 150-acre impoundment in a former slough of the Suamico River. A lift-type pump was installed to pump water from the Suamico River into the impoundment. In 1965 a small 35-acre sub-impoundment was created. Another sub-impoundment was created shortly thereafter, with water control structures installed to allow water to be stepped down into the main impoundment.

In response to high Lake Michigan water levels in the late 1970s, repairs were made to the main dike along the shoreline in 1979, including armoring with rip-rap. However, water levels continued to rise to unprecedented levels into the 1980's and the lake overtopped the dike. Several breeches formed in the sub-impoundment dikes and the pump, which was no longer needed to pump water into the main impoundment, fell into disuse and was eventually disconnected. In 1996, major work was completed on the main dike, with reconstruction sufficient to withstand a 100-year flood event. Since that time, the main impoundment has been redesigned with several water control structures to better manage water levels, as well as to restore Northern pike spawning areas that were lost when the impoundment was created in 1959. A new pump, to be installed by September, 2013, has an improved design that allows water to be pumped both in and out, and also can be configured to allow water to drain or fill through natural forces.

In 2011, the Wisconsin DOT transferred to the Department 212 acres of wetland mitigation in the northwest corner of Sensiba and directly adjacent (125.5 acres of this fall outside the project boundary). Much of this mitigation site has been transformed into two separate wetland basins on the north and south sides of Resort Road, each with its own water control structure and each utilizing a separate drainage system. On the north side, a tributary that crosses Bayside Road currently provides Northern pike spawning

habitat. On the south side, hydrologic connectivity to the former DOT mitigation site will be through a newly-created waterway that runs through Sensiba to Green Bay.

A small (12-acre) Scattered Fishery Habitat area is located on the Suamico River approximately a half-mile west of Sensiba, just upstream from the Suamico River crossing on CTH J. This site protects a slough of the Suamico River. It was once used as a fish-rearing pond and has been restored by removing the remnants of weirs on either end of the slough to allow free passage to fish. Some materials were also dredged from a backwater area. The site will be allowed to revert to natural vegetation.

Habitat and Vegetative Cover

Adjacent to the Green Bay shoreline, Sensiba has coastal wetlands that are a mixture of cat-tail-dominated emergent marsh and sedge meadow with smaller areas of lowland shrub. Farther inland, forests of lowland hardwoods and oak dominate the western portion of the property, with smaller areas of aspen and upland hardwoods. Several former agricultural fields are succeeding to shrubs and trees. Invasive plants are an ongoing issue on the property, with *Phragmites* and glossy buckthorn being the most problematic. Reed canary grass also is present. A breakdown of general cover types is provided in Table 21. Cover types are shown on Map K-2.

Additional details on vegetative communities present on Sensiba are provided in the description of the Primary Site below.

The DOT wetland mitigation acres had been completely stripped to provide material for the Highway 41 reconstruction project. The liner drainage ditch was reshaped with meanders then replanted in 2011-2012 with a mesic meadow mix, areas of swamp hardwood tree species, and emergent wetland seed mixes. DOT has a ten-year management agreement to control invasives and ensure the infrastructure’s integrity.

Table 21. Sensiba Unit Cover Types.

Cover Type	% Cover
Agriculture	<1
Aspen	4
Bottomland Hardwood	9
Emergent Vegetation	25
Grassland	8.5
Lowland Shrub	8
Oak	7
Open Water	2
Shrub	3
Swamp Hardwood	11
Upland Conifer	<1
Upland Hardwood	14.5
Urban/Developed	<1

Cover Type	% Cover
Wetland-Non-Forested	6

Primary Sites

Sensiba Wetlands – 720 acres (GPBG04)

This site, north and south of where the Suamico River enters Green Bay, is comprised of the Sensiba Unit and the northern part of the Long Tail Unit (the area is also known as Dead Horse Bay) and lies on poorly-drained sandy lakeplain (Map K-4).

This mostly wetland site is characterized by a large Emergent Marsh dominated by cat-tails and interlaced with open water channels, weedy areas, and clones of common reed grass (*Phragmites*); a sizable but highly disturbed, open-canopied forested wetland dominated by ash and other swamp hardwoods lying between the Emergent Marsh and uplands to the west; and a Southern Sedge Meadow dominated by blue-joint grass and cat-tail with common reed grass and purple loosestrife as common associates.

Sensiba Wetlands was recognized as an important stopover site due to the high estimates of use by a variety of migratory birds (Grveles et al. 2011). This site is estimated to have the highest numbers of all west shore areas for numerous migratory bird groups, with the fall season having extreme importance. The marsh and meadow communities, water resources, and forest cover provide the critical resources needed to support large numbers of migratory birds, including food, shelter, and protection from predation. It may also contain habitat niches that provide unique or rare resources to specialized species.

Sensiba Wetlands, along with portions of Long Tail Point and Duck Creek Delta, is included within the Lower Fox River and Green Bay Area of Concern (AOC) (www.epa.gov/glnpo/aoc/greenbay.html). This AOC, which includes the lower 11.2 km of the Fox River below the DePere Dam and a 55 km² area of southern Green Bay out to Point au Sable and Long Tail Point, was designated primarily because of water quality problems and public use restrictions. The acquisition of property within the GBWS WA is part of the action to enhance fish, wildlife, and habitat within the AOC.

This wetland remains an important breeding site for marsh birds and an important migratory stopover for waterfowl, waterbirds, shorebirds, raptors, and neotropical landbirds. Both rare plants and animals have been documented here, although much of the habitat that previously supported these species has been destroyed or severely degraded by a system of dikes and ditches and by invasive species.

Administrative Facilities and Access

Resort Road provides access to the northern part of Sensiba and Sunset Beach Road to the southern portion. CTH J connects these two roads. Sensiba is served by three parking areas. One of these, on Sunset Beach Road, is maintained by Brown County

through an agreement with the Department and is used as overflow parking for a very high-volume, county-owned boat access site just to the east. The other two parking areas, one on Resort Road and one on Bayside Road, are maintained by the Department. A Department service road, used for management access, is located in the northern portion of the property, off Resort Road, and connects to the northern portion of the dike around the main impoundment.

The Village of Suamico owns an unimproved boat access and park to the east of Sensiba off Sunset Beach Lane. This access is used primarily during the winter by ice fisherman and in the fall by waterfowl hunters and has a small park and picnic area associated with it. Foot access to the lakeward portion of the main dike is available at the cul-de-sac of Sunset Beach Lane. This is a popular place to view wildlife.

A series of water control structures are used for wetland management on Sensiba. Five of these already exist and a sixth, a high-volume pump, will be installed by September, 2013. Once current reconstruction activities are complete, there will be approximately 2.5 miles of dikes, two main impoundments, and two sub-impoundments. There also is a 12'x10' tin storage shed near the pumphouse.

A waterfowl closed area was established on the main impoundment shortly after its completion in 1959 to provide a refuge for waterfowl while being hunted on the Bay. No hunting is allowed in the closed area during open waterfowl seasons, though trapping and other activities are still permitted. Sensiba infrastructure is shown on Map K-3.

The former DOT site has limited parking access. There are no designated parking areas, but three driveways with culverts which allow equipment onto the property are often used for parking by visitors to the property. Two water control structures are used for wetland management and, when current reconstruction activities are complete, there will be 2.5 miles of dikes. The dikes divide the site into three basins north of Resort Road, two of which will provide pike spawning and waterfowl habitat. South of Resort Rd is a shallow water basin that drains out through private property to the Sensiba Unit.

Recreation

Sensiba's close proximity to the Green Bay metropolitan area makes it heavily used for outdoor recreation. Hunting and trapping are the main uses of the property. Hunting is especially notable for waterfowl and upland game. When water levels are high, trapping for muskrat and mink can be bountiful. Coyote and fox also are trapped.

While there currently are no designated trails on Sensiba, the dike tops are commonly used as walking paths. Many of the immediate neighbors enjoy daily hikes on the property. Wildlife viewing is growing in popularity. Birders and wildlife photographers are increasingly attracted by a colony of yellow-headed blackbirds that breeds annually here.

Recent reconstruction activity on the dikes' infrastructure has led to an interest in trail development by the Village of Suamico. As part of the implementation of their community strategic plan, they wish to create a walking trail on the dike tops. This project would create a loop about 3 miles in length that would extend and connect the dike tops. It would include connection to a boardwalk, construction of a viewing platform, an extension to the boat launch, and ADA-compliant development. There also is interest in creating a water trail linking Sensiba to Long Tail Point and expanding the trails on Sensiba to the former DOT mitigation site in the future.

Recreational use of the former DOT site has been light, though expected to increase as the public becomes more aware of it. Currently, goose and turkey are hunted on the property. Once water levels are managed and vegetation takes hold, the site will offer additional waterfowl hunting opportunity as well as trapping opportunity for mink, muskrat, and canids.

Current Management

Management on Sensiba currently emphasizes wetland and forest management. Wetlands are managed primarily through water level manipulation to benefit waterfowl, spawning fish, and other wetland-dependent wildlife. Recent reconstruction of dikes and related infrastructure will improve the ability to manage water levels. The current focus is to expand hemi-marsh conditions (approximately equal proportions of emergent vegetation and open water) by increasing water levels. This will drown out woody encroachment and thin dense cat-tail stands by encouraging higher muskrat populations.

The reconstruction also has redirected water passage between the former DOT mitigation site and Sensiba, allowing water flowing in from upstream to be captured in either impoundment or to bypass the impoundments altogether via a bypass ditch that has been created to restore connectivity to Green Bay.

The former DOT mitigation site has several deep-water pockets exclusively for waterfowl. Shallow scrapes with water control structures provide additional Northern pike spawning habitat. The creek crossing Bayside Road on the north portion of the site already provides pike spawning but a structure was added to retain water after adult pike have spawned and returned to Green Bay. The intent is to increase survivorship of fry once they reach Green Bay by allowing them to grow to a larger size in this protected nursery before they are released and flushed downstream to the Bay. A similar structure has been added to a spawning area in the southeastern portion of Sensiba.

Management to control invasive plants is ongoing. Wetland invasives such as *Phragmites* and reed canary grass are controlled through water level manipulation and chemical applications, most recently as part of a GLRI-funded effort to control *Phragmites* along the entire west shore.

Forest management focuses on bottomland hardwoods in the lowland areas and oak in the upland areas. The goal is to maintain a mix of forest types and ages to provide habitat for

a variety of resident and migratory wildlife. Former agricultural fields will be allowed to succeed to forest.

GREEN BAY WEST SHORE WILDLIFE AREA—LONG TAIL UNIT

Project Boundary:	1,818 acres
Managed Land:	317 acres
Inside boundary:	317
Outside boundary:	0

PROPERTY DESCRIPTION

The Long Tail Unit is located approximately one mile east of the Village of Suamico in Brown County, south of the Suamico River (Map L-1). The main parcel is south of Riverside Drive. Other parcels are located on Longtail Beach Road and Longtail Beach Lane. This Unit also includes the southern portion of Long Tail Point, a sand-spit depositional feature projecting into Green Bay.

In 1936, a federal waterfowl refuge was established on 104 acres of Long Tail Point. This refuge was terminated in 1961 and the land turned over to the state to become the Long Tail Unit. Additional land was acquired in 1999 and 2002.

Long Tail Point hosts several archaeological and historic sites, including the remnants of a lighthouse.

Habitat and Vegetative Cover

The mainland portions of the Long Tail Unit consist of emergent marsh, shrub-carr, and bottomland hardwoods, with small areas of oak and upland hardwoods. The types and extents of habitats on Long Tail Point depend on water levels in Green Bay. Habitat types typically grade from emergent wetlands to sedge meadows, shrub-carr, and cottonwood cospes. Table 22 provides a breakdown of generalized cover types. Cover types are shown on Map L-2.

Additional details on the vegetative communities present on Long Tail are provided in the description of the Primary Site below.

Table 22. Long Tail Unit Cover Types.

Cover Type	% Cover
Agriculture	<1
Aspen	<1
Bottomland Hardwood	15
Developed	<1
Emergent Vegetation	31
Grassland	14.5
Lowland Shrub	10
Oak	1

Cover Type	% Cover
Open Water	2
Shrub	5
Upland Hardwood	20
Wetland-Non-Forested	<1

Primary Sites

Sensiba Wetlands – 720 acres (GPBG04)

This site, north and south of where the Suamico River enters Green Bay, is comprised of the Sensiba Unit and the northern part of the Long Tail Unit (the area is also known as Dead Horse Bay) and lies on poorly-drained sandy lakeplain (Map L-4).

A full description of this Primary Site is provided in the write-up for the Sensiba Unit (p. 66).

Long Tail Point – 138 acres (GPBG05)

Long Tail Point is located on the west shore of lower Green Bay, two miles east of Suamico in northern Brown County (Map L-4). It is a narrow sand spit and associated embayment resting upon poorly drained sand lakeplain soils that stretch to the southeast for nearly four miles into lower Green Bay. The size and shape of the peninsula combined with the fluctuating water levels in lower Green Bay result in a very diverse assemblage of wetland flora and fauna. During high water level periods the point becomes a series of small islands.

The water table is at or near the surface throughout the entire site. Patches of black willow and plains cottonwood thicket occupy the highest ground, grading to the west into sizable monotypic clones of common reed grass (*Phragmites*) and, finally, a large good-quality Emergent Marsh dominated by cat-tails, soft-stem bulrush, and common three-square bulrush. The invasives *Phragmites* and purple loosestrife are common associates here and threaten to displace the currently dominant native species. On the eastern side of the point is a sandy beach that is well developed during periods of low water.

Long Tail Point has been recognized as a high-quality migratory bird stopover site that provides shelter and protection from predation and food and water resources important to many birds (Grveles et al. 2011). Forested stands on site contribute important migratory stopover habitat for extremely high estimated numbers of songbirds, particularly those forest blocks that have high structural diversity with a strong oak component. Because agriculture, large expanses of open water, and urban development dominate the surrounding landscape, these forest patches offer respite to exhausted birds traveling across mainly inhospitable terrain.

Long Tail Point, along with portions of Duck Creek Delta and Sensiba Wetlands, is included within the Lower Fox River and Green Bay Area of Concern (AOC) (www.epa.gov/glnpo/aoc/greenbay.html).

The management outlook for this site is complex considering that it has previously supported populations of state endangered species (common tern and Forster's tern), is an important migratory bird stopover site, is impacted by invasive species (*Phragmites* and zebra mussel shells), and is a popular recreation area.

Administrative Facilities and Access

Riverside Drive, Longtail Beach Road, and Longtail Beach Lane provide access to the various parcels within this Unit (Map L-3). The Department maintains two small parking areas on this property, one on the northernmost parcel, on Riverside Drive, and another on the parcel located on Longtail Beach Lane.

There is one Department-owned boat access sites with parking on Harbor Lights Road in the northern portion of the property. This site also has a day-use picnic area and is maintained by the Village of Suamico through a lease agreement. The boat access is not suitable for large motor boats, and is used primarily by duck hunters, canoeists and kayakers, and ice anglers. Low water levels can reduce its utility.

Recreation

Hunting, fishing, and trapping are the main recreational uses on the mainland portions of the Long Tail Unit. Hunting is especially notable for deer, waterfowl, and small game. Trappers pursue otter, mink, coyote, and, especially during periods of high water, muskrat. Fishing occurs in the embayment created by Long Tail Point and in the main waters of Green Bay, primarily in winter. Perch are taken in the early ice-fishing season. In the late season, when perch fishing closes to protect spawning fish, the focus turns to Northern pike.

Long Tail Point receives a considerable amount of day use, largely during the warm summer months, from recreational boaters launching from a variety of places in lower Green Bay. Concentrations of people in the shallows and along the beaches of Long Tail Point can have negative impacts on wildlife use of the area, primarily for nesting waterbirds during the breeding season.

There is cooperative interest between the Department and the Village of Suamico in developing the site of the historic lighthouse on Long Tail Point. The intent would be to create an interpretive water trail, launching from Harbor Lights Road, Bayshore Drive, or Sunset Beach Lane, that would direct paddlers along the lakeshore to points of historical, cultural, or natural interest or significance.

Current Management

Management on Long Tail Point has focused on controlling invasive species, primarily *Phragmites*, which now dominates the Point. The area was treated recently with aerial application of herbicide as part of GLRI-funded control effort along the entire west shore. This will be followed by mowing and periodic spot treatments to help contain the invasive grass. A bald eagle nest and a heron rookery on the Point are monitored.

Other lands within the Unit are managed for wildlife and fishery benefits. There may be opportunities for fisheries enhancement. Emergent wetland and shrub-carr along the lakeshore are affected by fluctuating water levels in Green Bay and mostly are passively managed. Forested areas will be maintained through sustainable forestry practices to maintain a diversity of size and age classes and to control invasives.

GREEN BAY WEST SHORE WILDLIFE AREA—PEATS LAKE UNIT

Project Boundary:	1,341 acres
Managed Land:	573 acres
Inside boundary:	491
Outside boundary:	82

PROPERTY DESCRIPTION

The main portion of the Peats Lake Unit is located approximately one mile north of the City of Green Bay in Brown County, on either side of US Highway 41. Another parcel is located northeast of this along N. Lakeshore Drive/CTH J (Map M-1).

The first acquisition for the Peats Lake Unit was in 1983. The most recent purchase was in 2004. The acquisition focus in this Unit has been to preserve valuable wetlands that are vital to the future management of waterfowl and recreational use along the Green Bay shore.

Two Scattered Fishery Habitat parcels are located near this Unit, to the northwest outside the project boundary. One is along Lineville Road and the other is along Sunny Lane. Both were acquired for fish spawning habitat, and both support Northern pike spawning during periods of ample water.

Habitat and Vegetative Cover

Lower, wetter areas on the Peats Lake Unit consist of emergent marsh, sedge meadow, shrub wetlands of willow, dogwood, and alder, and bottomland hardwoods dominated by ash. Upland areas are a mixture of low-density aspen and oaks. Table 23 provides a breakdown of cover types. Cover types are shown on Map M-2.

Wetland areas provide important stopover habitat for migratory waterfowl and other wetland birds. Upland areas host deer, squirrels, cottontail rabbits, and a variety of resident and migratory birds.

Invasive species are a major concern on this Unit. After the destruction of the Cat Island Chain due to sustained high lake levels in the late 1960s-70s, the productive wetlands of Peats Lake and Duck Creek slough were unprotected from storm surges and seiche events, which destroyed and degraded much of the native wetland vegetation. Much of the shoreline is now infested with *Phragmites* and purple loosestrife. Lowland forest areas are choked with glossy buckthorn.

Additional details on the vegetative communities at Peats Lake are provided in the description of the Primary Site below.

Table 23. Peats Lake Unit Cover Types.

Cover Type	% Cover
Aspen	14
Bottomland Hardwood	24
Emergent Vegetation	13
Grassland	2
Lowland Shrub	24
Oak	7.5
Open Water	<1
Upland Hardwood	7
Urban/Developed	<1
Wetland-Non-Forested	15

Primary Sites

Duck Creek Delta – 264 acres (GBPG06)

Duck Creek Delta (also called Peats Lake and Atkinson Marsh Complex) is located near the southern end of Green Bay, west of the mouth of the Fox River and on either side of the mouth of Duck Creek (Map M-4). This wetland complex is situated in shallow water in lower Green Bay and is characterized by stands of emergent aquatic macrophytes on extensive mudflats. The invasive common reed grass (*Phragmites*) has formed large monotypic clones and dominates much of the area. Shrub-carr, dominated by meadow willow and red osier dogwood, occurs between the Emergent Marsh and US Highway 41. Condition of this marsh is variable and many portions of it have been extensively diked and filled, degrading the site and reducing its acreage and functions.

The estimates of migratory bird use at Duck Creek Delta indicate very high numbers of migratory shorebirds likely utilizing the mudflats and low water areas of the delta for foraging areas. The extensive fruit-producing shrubs at the site are important for migratory landbirds in the fall (Grveles et al. 2011).

Duck Creek Delta, along with portions of Sensiba Wetlands and Long Tail Point, is included within the Lower Fox River and Green Bay Area of Concern (AOC) (www.epa.gov/glnpo/aoc/greenbay.html).

Duck Creek Delta is an important migratory bird stopover area for shorebirds, waterfowl, waterbirds, and neo-tropical landbirds during both the spring and fall migration. This site also provides habitat for rare species dependent on Emergent Marsh vegetation. Management opportunities at Duck Creek Delta include maintaining migratory bird stopover habitat for both spring and fall migrations and maintaining the Emergent Marsh vegetation.

Administrative Facilities and Access

East and West Deerfield Roads, which serve as frontage roads to US Highway 41, provide the main access to the Peats Lake Unit (Map M-3). There is one Department-owned boat access site with parking, located on Bayshore Drive near the end of Lineville Road. This access is not suitable for large motor boats, and is used primarily by duck hunters, canoeists and kayakers, and ice anglers. Low water levels can reduce its utility.

The Department maintains five other small gravel parking areas: two on N. Lakeshore Drive, one on Shore Heights Road, one on West Deerfield Avenue, and one on Riverview Drive.

At the end of Bayshore Drive there is a very small Department-owned parcel past the terminus of the road. An ADA-compliant duck hunting blind was built here, and is maintained, by the Green Bay Duck Hunters Association.

Recreation

The main recreational uses at Peats Lake are hunting, fishing, and trapping. Hunting is especially notable for deer, turkey, waterfowl, and small game. Large numbers of waterfowl hunters pursue puddle ducks at Peats Lake. Fishing for perch and pike was exceptional in Duck Creek during high-water years. Muskrat trapping is notable in the sloughs of Duck Creek.

Current Management

Peats Lake is managed to support wetland-dependent wildlife and fish. Much of the management focuses on control of invasive species, notably *Phragmites*, purple loosestrife, and glossy buckthorn. The proximity of this Unit to major highways (US 41 and Interstate 43) creates some management challenges, particularly regarding the ability to conduct prescribed burns. A warm-season grass planting on the parcel west of West Deerfield Avenue has suffered from woody encroachment due to lack of prescribed fire, and also from root-rot from high water levels.

Aspen and bottomland hardwood stands are maintained through sustainable forestry practices and managed to control invasives, especially glossy buckthorn. Stands of *Phragmites* have been treated with aerial application of herbicide as part of GLRI-funded control effort along the entire west shore.

The U.S. Army Corps of Engineers, Brown County Port and Solid Waste Department, and other partners are currently collaborating on a project to rebuild the Cat Island Chain, a series of small barrier islands and shoals extending into Green Bay across from the Duck Creek Delta. This key structural and habitat feature once protected over 1,400 acres of coastal wetlands along the southern Green Bay shore from high-energy waves and storm events. These wetlands along with the islands and shoreline comprised a very productive system that supported a diversity of fish, amphibians, furbearers, waterfowl,

waterbirds, colonial nesting birds, and other migratory birds. Sustained high lake levels from the late 1960s into the mid-1970s and ongoing wave erosion and storm events resulted in the disappearance of the Cat Island archipelago. The ongoing project to reestablish the island chain will involve a 2.5-mile wave barrier with 272 acres of original island footprint. Clean dredged materials from the lower Fox River and Green Bay will be used to rebuild the islands.

This project could have management implications for the Department in the future, as the hoped-for reestablishment of emergent wetlands behind the wave barrier could occur along the shoreline adjacent to the Peats Lake Unit.

FINDINGS AND CONCLUSIONS

This section presents findings and conclusions based on all the regional and property-specific data contained in this RPA. The first two sub-sections summarize existing conditions and trends on the properties and in the region, including the ecological significance and capability of the properties and the properties' recreational needs, opportunities, limitations and significance. The final sub-section presents the major findings and conclusions. This summary is not meant to be an exhaustive overview, but rather highlights the major themes brought forth in the RPA.

These findings and conclusions will help guide future management, use, and development of the GBPG properties by highlighting significant opportunities and limitations on these properties, and setting the stage for a reasonable range of management alternatives that may be considered during the master planning process. As planning continues, these conclusions will help define the Vision and Goals of the future Master Plan.

THE GBPG PROPERTIES

The GBPG includes 12 named properties and other state-owned lands located along the west shore of Green Bay in Brown, Marinette, and Oconto counties (Map A). The properties include one WA, four SNAs, a gift lands parcel, and several scattered fishery and wildlife habitat parcels. The Green Bay West Shore WA (8,875.5) contains 11 separate, non-contiguous units scattered along the west shore, including three embedded SNAs (Map B). A stand-alone SNA, Bloch Oxbow (597.5 acres), comprises the twelfth named property. There also is a 757-acre gift lands parcel in Marinette County, the Badger Gift Lands, several Scattered Fishery Habitat and Statewide Wildlife Habitat parcels, and some transferred DOT wetland mitigation acreage. In total, the GBPG encompasses 10,654 acres of state protected and managed land.

Open and forested wetlands are dominant natural features on the GBPG properties. Some of these habitats exist in tracts that are extensive, of high quality, or that are regionally rare or significant. Open wetlands, including emergent marshes, sedge meadows, and shrub swamps, are the most prevalent, comprising approximately 51% of land cover in the plan area. Forested wetlands, composed mostly of bottomland and swamp hardwoods, make up approximately 21.5%. Aspen, oak and other upland hardwoods, grasslands, upland brush, and agriculture make up the remainder.

The character of the plan area changes somewhat from south to north. The southern properties of the GBPG, in Brown and southern Oconto counties, are in close proximity to the heavily developed and densely populated Green Bay metropolitan area and receive more pressure for recreational use. The northern portions of the plan area are more sparsely populated, and the properties there tend to have a wilder character. While the populations of all three plan area counties are expected to grow, Brown and Oconto counties are projected to increase at a significantly faster rate than Marinette County, with much of the growth expected in suburban and exurban areas associated with the City

of Green Bay. This is likely to affect the GBPG properties, as regional population size and growth can be significant drivers of recreational demand on public lands. Brown County in particular has a very low proportion (0.7%) of public conservation land. Oconto and Marinette counties have much larger proportions of public lands (29.7% and 30.3%, respectively), but these are concentrated in the central and northern portions of both counties, at some distance from the major population centers and from the GBPG properties.

Economically, the plan area counties currently are in transition. There is movement away from manufacturing, construction, and extractive industries and towards an economy based more on services, including recreation and tourism.

ECOLOGICAL SIGNIFICANCE AND CAPABILITY

REGIONAL CONTEXT

Lake Michigan and its distinctive shoreline features are defining characteristics of both Ecological Landscapes—Northern Lake Michigan Coastal and Central Lake Michigan Coastal—that comprise the plan area. Extensive coastal marshes and other wetland communities, a river delta, sandspits, and embayments are regionally significant features for which the GBPG properties offer major management opportunity.

The coastal wetlands on the GBPG properties represent approximately 50% of all wetlands remaining on the shoreline of Lake Michigan. The entire plan area is included in the Green Bay West Shores Conservation Opportunity Area (COA), which is considered to be of global significance. The GBPG properties offer significant opportunity to manage for numerous rare species and natural communities, some of which are regionally rare. These include Emergent Marsh, Northern Sedge Meadow, Southern Sedge Meadow, Shrub-Carr, Floodplain Forest, and Great Lakes Beach. Floodplain Forest along the Peshtigo River is at the extreme northeastern edge of its range in Wisconsin. Great Lakes Barrens, a globally rare community known from very few sites in Wisconsin, is present on one of the GBPG properties. Forty-four rare animal species and 18 rare plant species have been documented on the plan area properties.

PROPERTY OPPORTUNITIES

Extensive Coastal Wetlands

Though greatly diminished and degraded from their historical extent, the coastal wetlands along the west shore of Green Bay continue to be a productive and critical resource. The GBPG properties encompass a significant amount of this wetland acreage. These wetlands, some of which are large and of high quality, provide important breeding and migratory stopover sites for waterbirds, spawning areas for fish, and habitat for many other species of wetland-dependent wildlife. They also support populations of rare plants and animals, including invertebrates. The GBPG properties offer management opportunity for a variety of natural community types, including Great Lakes Beach,

FINDINGS AND CONCLUSIONS

Riverine Mud Flat, Emergent Marsh, Southern Sedge Meadow, Shrub-Carr, Southern Hardwood Swamp, Floodplain Forest, and Warmwater River.

Migratory Bird Stopover Habitat

The Great Lakes shoreline plays a crucial role for millions of migrating birds. The GBPG was identified as a high-quality Migratory Bird Stopover Site in a strategy to identify and protect migratory stopover habitats in the western Great Lakes (Grveles et al. 2011). The GBPG provides stopover habitat for an estimated up to 10,000 waterfowl, shorebirds, and other waterbirds; up to 1,000 raptors; and 10,000+ neo-tropical landbirds during the spring and fall migrations. Many factors contribute to the GBPG's ability to provide all of the resources (e.g., shelter, protection from predators, food, and water) needed by migrating birds, including its north-south orientation and variety of high-quality native habitats. The location of the GBPG in a landscape dominated by agriculture and urban settings makes the remaining natural habitats, especially those with high structural diversity near water, very important foraging and perching opportunities.

Fish Spawning Habitat

The coastal wetlands along the west shore of Green Bay have long been recognized for their importance to spawning fish (Brazner and Beals 1997; WDNR 2006a). Green Bay supports significant populations of smallmouth bass, walleye, yellow perch, Northern pike, and many nongame fish, which require flowing water and shallow wetlands with beds of emergent and submergent vegetation for spawning and fry-rearing habitat. The small perennial and interconnected streams and wetlands of the GBPG properties provide these critical nursery areas for many species of native fish. Although lake sturgeon spawn upriver from the plan area, the lower Peshtigo and Oconto rivers provide essential habitat for juveniles that ultimately increases their survival rate in Green Bay and accelerates lake sturgeon restoration.

LIMITATIONS AND CHALLENGES

Development pressure, altered hydrology, impaired water quality, and invasive species all represent major challenges to maintaining the ecological significance of the GBPG properties.

Many wetlands along the west shore of Green Bay already have been destroyed through conversion to agricultural use and industrial, residential, and recreational developments. Such conversions often are accompanied by hydrological modifications (e.g., ditching, diking, etc.) and infrastructure (roads, culverts, power lines, etc.) that degrade existing wetlands by disrupting hydrology, serving as a source of pollutants, facilitating the spread of invasive species, and creating physical barriers to movement of some species. Development pressure is expected to increase in the plan area with projected population growth, particularly in Brown and Oconto counties. This may affect the viability of remaining wetland areas.

FINDINGS AND CONCLUSIONS

Water quality has been compromised, particularly in lower Green Bay, by industrial and municipal contaminants and wastewater discharges, and also by agricultural runoff. Longer-term water level changes in Green Bay have dramatically affected the extent and quality of wetland vegetation in coastal marshes. Historic low- and high-water fluctuations over the past three decades greatly contributed to the explosion in populations of several invasive wetland plants, notably *Phragmites* and non-native cattails, which has degraded habitat quality and reduced populations of native wetland wildlife, particularly birds.

Many other invasive plant and animal species pose significant management challenges. These include purple loosestrife, reed canary grass, glossy buckthorn, Eurasian water-milfoil, rusty crayfish and common carp. Invasive plants and forest pests, along with fluctuating water levels, threaten the health, viability, and regeneration of forests on the properties. Reed canary grass and glossy buckthorn adversely affect tree generation, as does herbivory by white-tailed deer. Forest pests of concern include the emerald ash borer, which is expected to have a significant impact on the ash resource, as well as gypsy moth and oak wilt which already have impacted much of the oak.

Encroaching development also may limit or preclude the use of certain management practices. Prescribed fire is an important management tool for the maintenance of open wetland and upland grassland habitats. The ability of managers to use fire as a management tool already has been, and will continue to be, challenged by the proximity of residential developments and major highways, particularly in the southern portion of the plan area.

RECREATIONAL SIGNIFICANCE AND CAPABILITY

REGIONAL CONTEXT

Recreationally, the region of northeast Wisconsin where the GBPG properties are located is notable for its association with the Lake Michigan shoreline, rivers such as the Menominee, Oconto, Pike, Popple, and Peshtigo, and other water resources that draw many residents and visitors for water-based activities such as fishing and boating. It is also notable for the urban center of Green Bay, which impacts the surrounding area with its suburban growth and cultural resources. This is reflected in the variety of recreational activities with high participation rates in this region, which include activities characteristic of both developed (e.g., golf; skateboarding) and undeveloped (cross-country skiing; off-road 4-wheel driving) settings and many water-based pursuits (e.g., fishing in the Great Lakes; scuba diving; wind surfing).

Brown County, the southernmost plan area county, reflects the urban influence of Green Bay, with an emphasis on serving urban/suburban recreational pursuits in more developed settings and very little public recreation land providing more rural or nature-based activities such as hunting. In contrast, Oconto and Marinette counties contain large tracts of public lands and offer much greater opportunity for activities such as hunting, trapping, cross-country skiing, horseback riding, ATV riding, and snowmobiling.

Projected population growth, particularly in Brown and Oconto counties, likely will lead to increased demand for outdoor recreational opportunities, and increased usage of public lands. A generally aging population may increase demand for physically less demanding pursuits such as wildlife viewing and accessible infrastructure.

PROPERTY USES, CAPABILITIES, AND LIMITATIONS

The GBPG properties' location in close proximity to the City of Marinette, City of Peshtigo, City of Oconto, and, most notably, the City of Green Bay is significant from a recreational perspective. The plan area properties provide the closest public land to these population centers. This is true even for Oconto and Marinette counties, whose extensive tracts of county and federal lands are concentrated in the central and northern portions of the counties, at some distance from these populated areas. The GBPG properties, therefore, are and will continue to be important providers of public outdoor recreational opportunities close to where people live.

The main recreational uses of the GBPG properties are the traditional outdoor pursuits of hunting, fishing, and trapping. The properties receive fairly heavy hunting use, especially for deer hunting but also for waterfowl and upland game. They offer access to the Green Bay shoreline for waterfowl hunters, ice anglers, and boaters. Trappers pursue muskrat, mink, and canids in the properties' coastal marshes. The properties also are used to a lesser extent for wildlife viewing, hiking, paddling, and cross-country skiing and snowshoeing. These nature-based pursuits are very compatible with the properties' primary purpose, dominant wetland vegetation communities, and mostly rural character, as well as with the physical limitations imposed by topography and soils.

Some potential exists on the GBPG properties to enhance existing recreational opportunities or develop additional ones, particularly in cooperation with external partners. Examples may include interpretive features, accessible viewing platforms, hunting blinds, and trails, shore fishing opportunities, improvements to an existing shooting range, walking trails on dike tops, and water trails. Kayaking and stand-up paddling/paddleboarding both are activities projected to show increasing demand in Wisconsin over the next five years, and the GBPG properties may offer opportunity to meet some of this demand. The Department is initiating a State Water Trails program, which will assist state and local government and conservation partners in the development and operation of a variety of water trail facilities and dissemination of water trails information. The GBPG properties will be evaluated for potential to be included in this program.

The plan area properties are not suited, however, to meeting most of the activities projected in the 2011-2016 SCORP (WDNR 2012) to have increasing demand in Wisconsin (e.g., adventure racing; developed/RV camping; visit a dog park; soccer outdoors; climbing), nor to addressing the regional nature-based supply shortages (campsites, parks, and land-based trails) identified in the 2005-2010 SCORP (WDNR 2006c). Recreational activities in developed settings, camping, and the majority of land-

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based trails (biking; horseback riding; ATV; snowmobile) generally are not permitted on WAs and SNAs as they are incompatible with the primary purposes of these properties. Most of the plan area soils are wet, poorly drained, permanently or seasonally inundated, or subject to blowing and consolidation when exposed. In addition, the water table is close to the surface in many areas, particularly during periods of heavy precipitation. Soil ratings for trail suitability indicate that the great majority of acreage on the GBPG properties has very limited suitability for trail development.

Other state, municipal, county, and federal lands in the plan area counties, especially the Marinette and Oconto County Forests and the Chequamegon-Nicolet National Forest, offer diverse camping and trail opportunities. The Brown County parks system is the chief purveyor of urban/suburban recreational activities in developed settings, such as playgrounds, ball fields, enclosed shelters, and dog parks.

SUMMARY

The GBPG properties contain a highly ecologically significant assemblage of natural communities, including diverse emergent wetlands, shrub swamps, and lowland forests. They contain some 50% of all coastal wetlands remaining on the shoreline of Lake Michigan, provide valuable fish spawning and migratory bird stopover habitat, and host populations of rare animals and plants. The entire plan area is included in the Green Bay West Shores Conservation Opportunity Area, considered to be of Global Significance due to its association with the shoreline of the Great Lakes.

Recreationally, the properties are important providers of public recreation land in close proximity to regional population centers. Deer, waterfowl, and upland game hunting, wetland furbearer trapping, and fishing are popular pursuits. The properties also are used for wildlife viewing, especially for waterfowl, cranes, herons, rails, and other wetland birds. Other activities include dog training, target shooting, hiking, paddling, and cross-country skiing. These activities are compatible with the properties' physical characteristics and mostly rural character. There is some potential to accommodate additional lightly-developed opportunities such as viewing platforms, water trails, and walking trails on dike tops. However, wet soils severely limit development of most trails and other recreational infrastructure. Low-impact, outdoor, nature-based activities are and will continue to be these properties' best and most appropriate recreational use.

With projected increases in population growth and development pressure, particularly in the southern part of the plan area, recreational demand on these properties will increase. Thoughtful planning and management will be needed to protect and maintain ecological values while providing a high-quality recreational experience for an increasing number of users.

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