



Rapid Watershed Assessment Pensaukee River Watershed

Rapid watershed assessments provide initial estimates of where conservation investments would best address the concerns of landowners, conservation districts, and other community organizations and stakeholders. These assessments help landowners and local leaders set priorities and determine the best actions to achieve their goals.

Wisconsin October 2007





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INTRODUCTION 1

The Pensaukee River watershed is located in Brown, Outagamie, Shawano and Oconto Counties, including the Oneida Nation lands, in Northeast Wisconsin. The total estimated area in the watershed is 212,257 acres

The terrain in the Pensaukee varies from nearly level to very steep. Soils are glacial till, outwash and lake plains with loamy to sandy soils in the north grading to finer-textured, clay loam subsoil in the southwest. Agriculture is the largest land use with dairy farms occupying the majority of cropland. Average farm size is 185 acres. Primary crops include corn, hay, and soybeans, as well as vegetables, and other forages. Pastureland in the watershed comprises about 9,000 acres. Hardwood forests are more prevalent in northern portions of the watershed. Agriculture in the southern area of the watershed faces substantial urban development pressure from the nearby cities along the Fox River corridor. All streams and rivers in the watershed eventually lead to Green Bay, and the coastal wetlands serve as important spawning habitat for Green Bay sport fish.

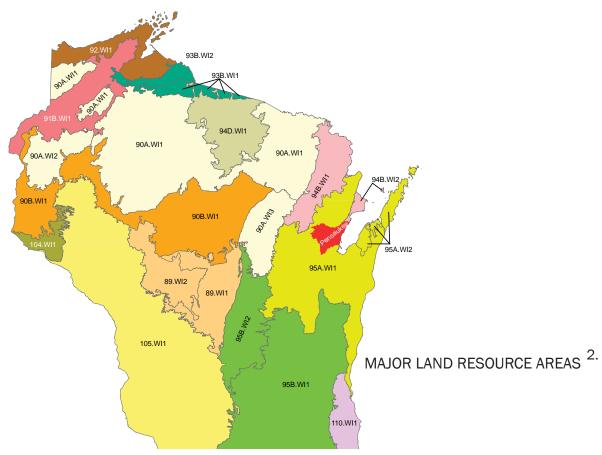






Name	Acres of	Acres in	% of HUC	% of County
	County	HUC	from County	in HUC
Oconto	649832	106252	50	16
Shawano	581878	61073	29	11
Brown	342108	36335	17	11
Outagamie	412367	8597	4	2





COMMON RESOURCE AREAS

Common Resource Area delineations are defined as a geographical areas where resource concerns, problems and treatment needs are similar. Common Resource areas are a subdivision of an existing Major Land Resource Area (MLRA). Landscape conditions, soil, climate and human considerations are used to determine the boundary of Common Resource Areas.

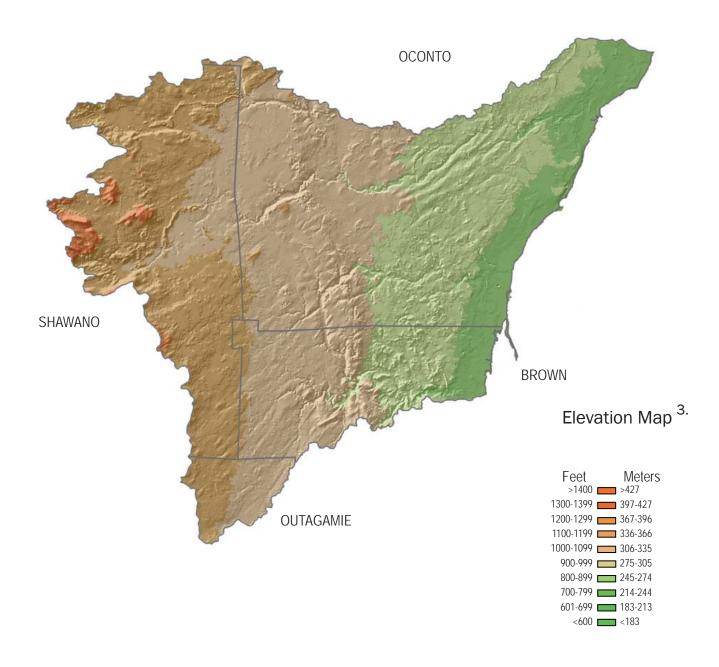
95A.WI1, DOOR/ESCANABA PENINSULAS AND LAKE PLAINS

Gently sloping well drained silty and loamy soils over bedrock with common wetlands and swamps. Mostly dairy and beef farm influenced cropland with some cash grain, grazing land, and fruit farms. Mixed deciduous and coniferous forest along the Lake Michigan shoreline. Significant development pressure on the Green Bay shoreline. Primary resource concerns are groundwater and surface water quality, nutrient management, cropland and construction site erosion, and recreational use.

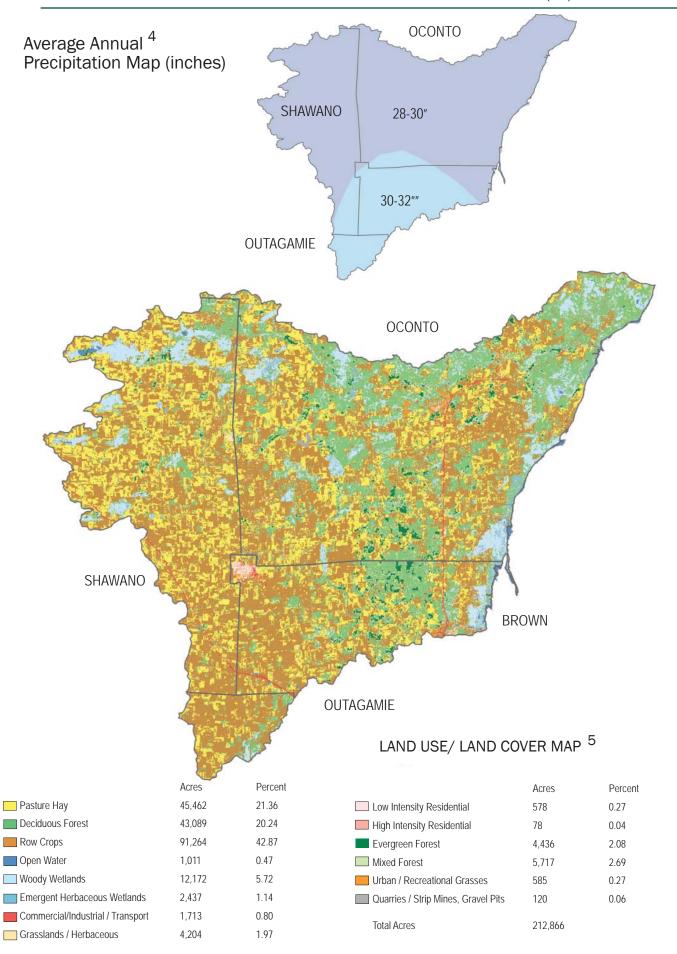
94B.WI2. SOUTHERN GREEN BAY LOBE MORAINE

Gently sloping to moderately steep hummocky moraine with scattered swamps. Mostly well drained loamy, clayey, and sandy soils with organic soils in the depressional areas. Major land uses are cash grain cropland and livestock agricultural enterprises, with significant grazing land and deciduous forest. Includes the Wisconsin River valley and eastern Baraboo Hills. Primary resource concerns are cropland soil erosion, surface water quality and wetland habitat protection and restoration.













ASSESSMENT OF WATERS

Section 303(d) of the Clean Water Act states that water bodies that are not meeting their designated uses (fishing, swimming), due to pollutants, must be placed on this list. The 303(d) impaired Waters List is updated every two years. Wisconsin is required to develop TMDLs, Total Maximum Daily Loads, for water bodies on this list. Exceptional Resource Waters (ERW) provide valuable fisheries, hydrologically or geologically unique features, outstanding recreational opportunities, unique environmental settings, and which are not significantly impacted by human activities may be classified as exceptional resource waters. Outstanding Resource waters (ORW) and ERW differ in that ORW do not have an associated point source discharge, where ERWs do.

303-d Listed Waters Map ⁶



For information on specific subwatersheds, 303(d) or Exceptional/Outstanding Resource Waters (ERW/ORW): http://dnr.wi.gov/org/water/wm/wgs/303d/fags.html and http://dnr.wi.gov/org/gmu/gpsp/gpbasin/



303(d) Waters	Dissolved Oxygen	Mercury	Phosphorous	PCBs
Green Bay - South of Marinette and its tributaries from mouths to first dam		Х		
Green Bay AOC (Inner Bay) (1)	X		Χ	Х
Exceptional Resource Waters				
None				
Outstanding Resource Waters				
None				

SOILS⁷

The soils in this watershed The soils in this watershed have formed in a variety of parent materials. The western, central and southern areas of the watershed have soils formed in glacial deposits and wind blown silts. These deposits formed gently rolling hills and upland plains containing dark brown silts overlying reddish brown loamy and clayey soils. Areas closer to the Bay of Green Bay have soils formed in glacial melt water material and glacial lake sediments. These glacial materials formed ridges, outwash plains, lake basins and depressions. Soils formed in these materials have brown silty and loamy material overlying brownish gray loamy sands, sands, and gravels. Depressions may have peat or muck overlying sands

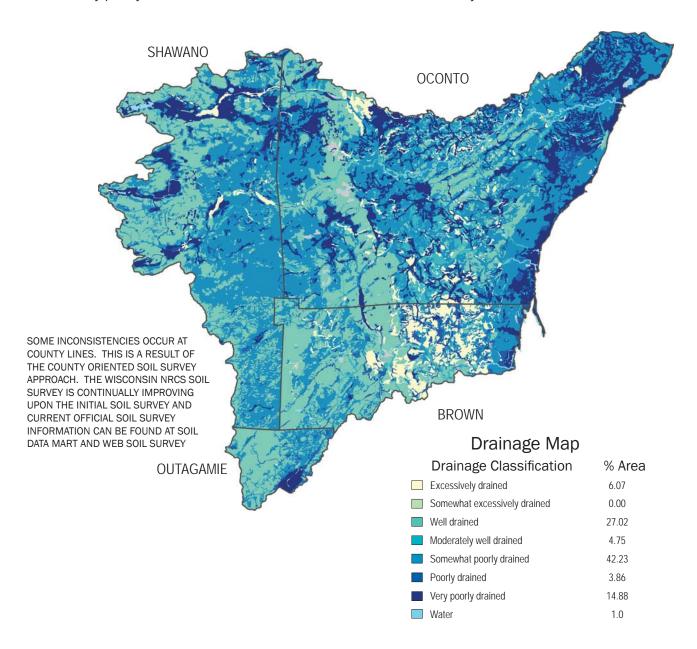
The initial Soil Survey of Wisconsin was completed in May of 2006. Soil Survey work in Wisconsin began in the early 1900s shortly after the inception of the National Cooperative Soil Survey. Early soil surveys produced were a joint effort between federal and state agencies. During the 1960s, 1970s, and 1980s, soil surveys depended on county cost-share monies and completed work projects varied around the state. Because of this partnership approach and because soil survey methods and concepts have improved over time, incompatibilities exist between counties.

The next phase of the Wisconsin Soil Survey will work to resolve inconsistencies brought on by the county based soil survey approach by implementing the Major Land Resource Area soil survey approach. By typifying soil series and mapunit concepts across similar geographic areas instead of by political boundaries, the inconsistencies between counties that exist now will be resolved. Updated soil survey information will be continually made available and can be obtained through the Web Soil Survey at http://websoilsurvey.nrcs.usda.gov for official and current USDA soil information as viewable maps and tables. Visit the Soil Data Mart at http://soildatamart.usda.gov to download SSURGO certified soil tabular and spatial data.



DRAINAGE CLASSIFICATION

Drainage class (natural) refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized–excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained. These classes are defined in the "Soil Survey Manual."



Visit the online Web Soil Survey at

http://websoilsurvey.nrcs.usda.gov for official and current USDA soil information as viewable maps and tables.

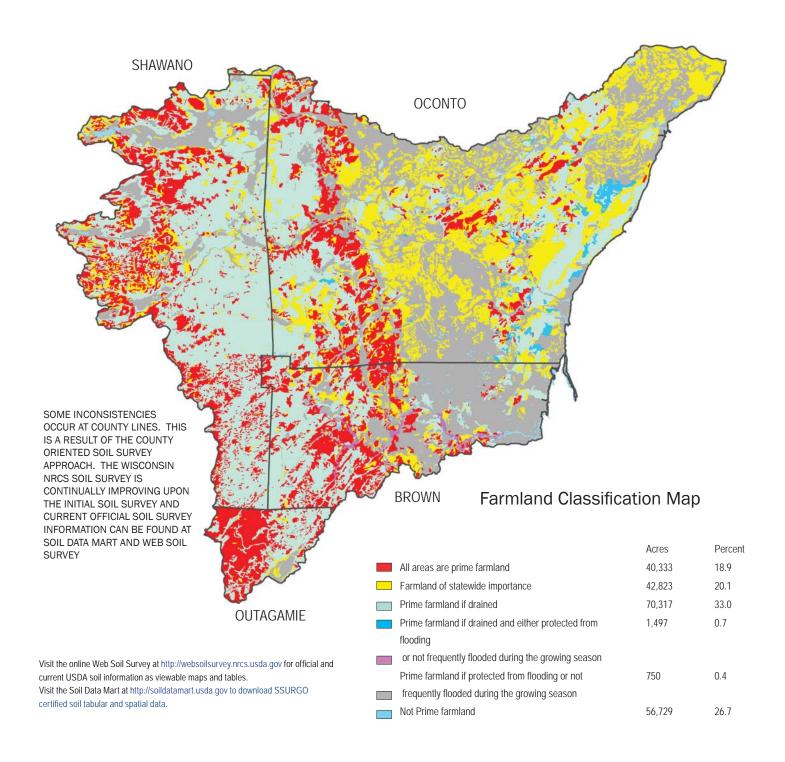
Visit the Soil Data Mart at

http://soildatamart.usda.gov to download SSURGO certified soil tabular and spatial data.



FARMLAND CLASSIFICATION

Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. Farmland classification identifies the location and extent of the most suitable land for producing food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the Federal Register, Vol. 43, No 21, January 31, 1978.

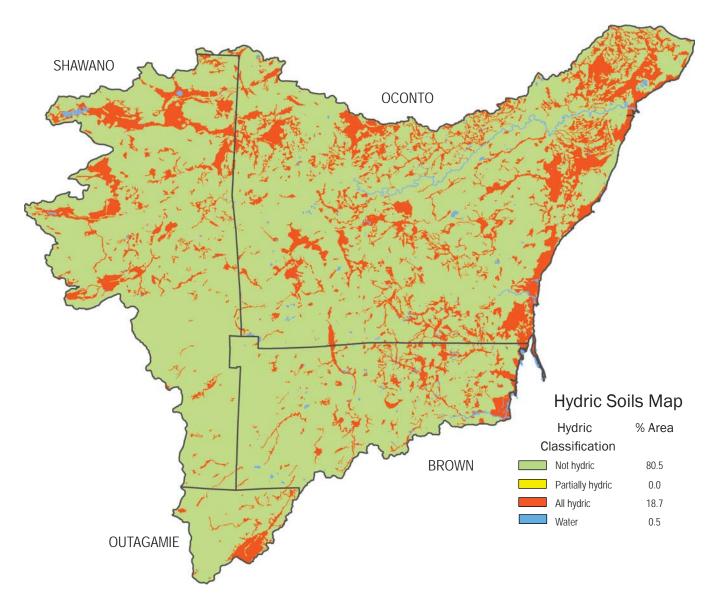




HYDRIC SOILS

This rating provides an indication of the proportion of the map unit that meets criteria for hydric soils. Map units that are dominantly made up of hydric soils may have small areas, or inclusions of non-hydric soils in the higher positions on the landform, and map units dominantly made up of non-hydric soils may have inclusions of hydric soils in the lower positions on the landform.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register 1994). These soils, under natural conditions, are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation. If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make on site determinations of hydric soils are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and others, 2002).



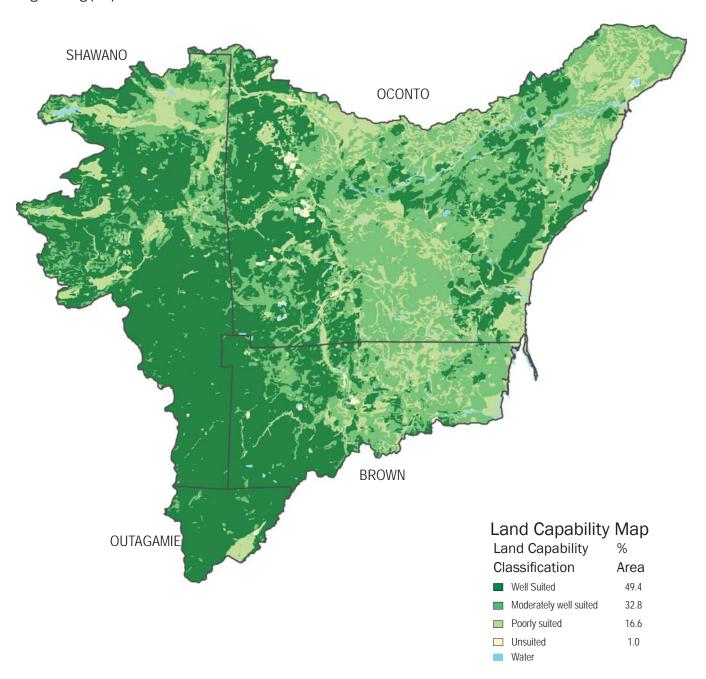
Visit the online Web Soil Survey at http://websoilsurvey.nrcs.usda.gov for official and current USDA soil information as viewable maps and tables.

Visit the Soil Data Mart at http://soildatamart.usda.gov to download SSURGO certified soil tabular and spatial data.



LAND CAPABILITY CLASSIFICATION

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive land forming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for forestland, or for engineering purposes.







ECOLOGICAL LANDSCAPE

GENERAL DESCRIPTION - NORTHERN LAKE MICHIGAN COASTAL

This Ecological Landscape is located in northeastern Wisconsin, and includes Green Bay and the northern part of the Door Peninsula. Its landforms consist of the Niagara escarpment, a prominent dolomite outcropping along the east side of Green Bay, a lacustrine plain along the west side of Green Bay, and ground moraine elsewhere. Low sand dunes and beach ridges that support Great Lakes endemics and many other rare species are found along the Great Lakes shoreline. The influence of Lake Michigan moderates extreme temperatures. Soils are very diverse; in some areas, lacustrine sands are found overlying clays or bedrock within only a few feet of the surface. In the Door Peninsula, soils are typically stony loamy sands to loams. Poorly drained sands are common in the lake plain or in depressions between dunes and beach ridges. On the western side of Green Bay, the ground moraine is composed mostly of moderately well drained, rocky sandy loams, interspersed with lacustrine sands and clays, and peat and muck also common.



PRS AND OTHER DATA

The following table is a product of the NRCS Performance Results System (PRS) and reflects progress made over the past several years on several key areas of conservation. The PRS provides support for reporting the development and delivery of conservation programs, analyzing and reporting progress, and management applications by NRCS and conservation partners. The public can generate additional reports by visiting the following link: http://ias.sc.egov.usda.gov/prsreport2006/

PRS PERFORMANCE MEASURES

PRS PERFORMANCE MEASURES	FY99	FY00	FY01	FY02	FY03	FY04	FY05	TOTAL
TOTAL CONSERVATION SYSTEMS PLANNED (ACRES)	450	13,632	8,963	7,952	4,631	N/A	12,226	47,853
TOTAL CONSERVATION SYSTEMS APPLIED (ACRES)	145	14,362	6,498	7,952	2,631	N/A	11,564	43,151
CONSE	RVATI	ON PF	RACTIO	CES				
TOTAL WASTE MANAGEMENT (313) (NUMBERS)	1	4	5	1	0	0	1	12
RIPARIAN FOREST BUFFERS (391) (ACRES)	0	12	0	0	5	2	0	19
EROSION CONTROL TOTAL SOIL SAVED (TONS/ YEAR)	143	41,482	3,823	11,465	2,750	N/A	N/A	59,662
TOTAL NUTRIENT MANAGEMENT (590) (ACRES)	0	6,790	5,736	3,997	909	306	3,437	21,174
PEST MANAGEMENT SYSTEMS APPLIED (595A) (ACRES)	0	2,175	1,916	478	1,247	2	2,064	7,882
PRESCRIBED GRAZING 528A (ACRES)	0	0	0	0	99	90	62	251
TREE & SHRUB ESTABLISHMENT (612) (ACRES)	0	120	106	47	10	10	40	333
RESIDUE MANAGEMENT (329A-C) (ACRES)	1,311	8,322	3,232	3,323	1,374	332	919	18,814
TOTAL WILDLIFE HABITAT (644 - 645) (ACRES)	292	320	358	181	65	5	56	1,277
TOTAL WETLANDS CREATED, RESTORED, OR ENHANCED (ACRES)	20	98	8	7	5	3	24	165
ACRES ENROLI	ED IN	FARN	/BILL	PROGI	RAMS			-
CONSERVATION RESERVE PROGRAM	117	427	171	292	22	N/A	79	1,110
WETLANDS RESERVE PROGRAM	0	0	0	0	0	N/A	0	0
ENVIRONMENTAL QUALITY INCENTIVES PROGRAM	0	13,121	6,176	3,010	1,354	N/A	3,927	27,587
WILDLIFE HABITAT INCENTIVE PROGRAM	0	9	0	0	0	N/A	0	9
FARMLAND PROTECTION PROGRAM	0	0	0	130	0	N/A	0	130

URBAN POPULATION 10

NAME	1990	2000	2004	MEDIAN INCOME*
HOWARD	9,874	13,546	15,912	51,974
PULASKI	2,200	3,060	3,540	43,017

POPULATION ETHNICITY 11

Total Population = 24,845 Urban population = 6,271 Rural Population = 18,575 White alone = 24,184 Hispanic or Latino = 129

Two or more races = 170

Black or African American alone = 57

Some other race alone = 32

American Indian and Alaska Native alone = 294

Asian Alone = 107

Native Hawaiian and Other Pacific Islander alone =0



CENSUS AND SOCIAL DATA (RELEVANT) 9

There are 488 farms in the watershed, covering a total of 90,704 acres. Average farm size in the watershed is 186 acres compared to a statewide average of 201 acres in Wisconsin. Please refer to the tables below for more detailed information or visit the web site of the Wisconsin Office of the National Agricultural Statistics Service at: http://www.nass.usda.gov/Statistics_by_State/Wisconsin/index.asp

	2002 AG CENSUS DATA	BROWN	OCONTO	OUTAGAMIE	SHAWANO	TOTAL
	FARMS (NUMBER)	118	186	30	154	488
	LAND IN FARMS (ACRES)	20867	35897	5533	28406	90704
	TOTAL CROPLAND (ACRES)	18079	25322	4639	19711	67751
	IRRIGATED LAND (ACRES)	41	111	4	16	172
	PRINCIPAL OPERATOR BY PRIMARY OC- CUPATION - FARMING (NUMBER)	74	110	19	106	309
	FARMS BY SIZE - 1 TO 10 ACRES	15	4	3	5	26
ZΕ	FARMS BY SIZE - 11 TO 49 ACRES	37	37	8	32	114
Y SI	FARMS BY SIZE - 50 TO 179 ACRES	35	81	10	62	188
FARMS BY SIZE	FARMS BY SIZE - 180 TO 499 ACRES	24	51	6	45	126
RM	FARMS BY SIZE - 500 TO 999 ACRES	4	8	2	8	22
FA	FARMS BY SIZE - 1,000 ACRES OR MORE	3	4	1	2	10
	LIVESTOCK AND POULTRY - CATTLE AND CALVES INVENTORY (FARMS)	61	93	14	92	260
TRY	LIVESTOCK AND POULTRY - CATTLE AND CALVES INVENTORY - BEEF COWS (FARMS)	14	35	3	24	75
LIVESTOCK AND POULTRY	LIVESTOCK AND POULTRY - CATTLE AND CALVES INVENTORY - MILK COWS (FARMS)	31	41	7	53	131
(AND	LIVESTOCK AND POULTRY - HOGS AND PIGS INVENTORY (FARMS)	6	6	1	4	17
TOCK	LIVESTOCK AND POULTRY - SHEEP AND LAMBS INVENTORY (FARMS)	2	3	1	3	9
LIVES	LIVESTOCK AND POULTRY - LAYERS 20 WEEKS OLD AND OLDER INVENTORY (FARMS)	4	12	1	7	24
	LIVESTOCK AND POULTRY - BROILERS AND OTHER MEAT-TYPE CHICKENS SOLD (FARMS)	3	2	0	2	7
	SELECTED CROPS HARVESTED - CORN FOR GRAIN (ACRES)	3400	5898	1173	4298	14769
	SELECTED CROPS HARVESTED - CORN FOR SILAGE OR GREENCHOP (ACRES)	2575	2499	501	2532	8107
	SELECTED CROPS HARVESTED - WHEAT FOR GRAIN, ALL (ACRES)	1032	934	188	322	2477
STED	SELECTED CROPS HARVESTED - WHEAT FOR GRAIN, ALL - WINTER WHEAT FOR GRAIN (ACRES)	0	0	185	0	185
HARVESTED	SELECTED CROPS HARVESTED - WHEAT FOR GRAIN, ALL - SPRING WHEAT FOR GRAIN (ACRES)	0	0	3	0	3
	SELECTED CROPS HARVESTED - OATS FOR GRAIN (ACRES)	579	372	75	631	1657
SELECTED CROPS	SELECTED CROPS HARVESTED - BAR- LEY FOR GRAIN (ACRES)	61	37	6	132	236
	SELECTED CROPS HARVESTED - SOY- BEANS FOR BEANS (ACRES)	2234	1926	893	1346	6399
	SELECTED CROPS HARVESTED - FOR- AGE - LAND USED FOR ALL HAY AND ALL HAYLAGE, GRASS SILAGE, AND GREEN- CHOP (SEE TEXT) (ACRES)	6344	7850	1096	8015	23306
	SELECTED CROPS HARVESTED - VEG- ETABLES HARVESTED FOR SALE (SEE TEXT) (ACRES)	91	870	82	219	1263
	SELECTED CROPS HARVESTED - LAND IN ORCHARDS (ACRES)	19	11	2	3	36



RESOURCE CONCERNS

Primary resource concerns from agriculture include cropland erosion, barnyard runoff, and overgrazing of streambanks. Industrial and municipal treatment plant discharges are also a water quality concern.

WATERSHED ASSESSMENT

To assess a watershed's agricultural nonpoint pollution potential, a model was used to generate a watershed assessment score relative to other 8-digit watersheds in Wisconsin. Factors used in the model include acres of cropland, acres of highly erodible land (HEL), and the number of animal units in the watershed. Scores ranged from 0.0 (lowest conservation need) to 24.2 (highest conservation need). The scores may be useful in determining funding allocations on a watershed basis for agricultural nonpoint pollution control initiatives. The model does not attempt to measure pollution levels and does not reflect pollution potential from point sources of pollution or other nonpoint pollution sources beyond the above criteria.

The watershed assessment score for the Pensaukee River Watershed is 1.6.

WATERSHED PROJECTS, STUDIES, MONITORING. ETC.

The Pensaukee River Priority Watershed Project began in 1994 and runs through December 31, 2007. The goal of the project is to reduce nonpoint pollution to the streams, lakes and groundwater of the watershed through the installation of conservation practices. Technical and financial assistance is available to watershed landowners for practice implementation.

The Wisconsin Department of Natural Resources conducts ongoing, baseline water quality monitoring in many streams and lakes within the watershed each year.

PARTNER GROUPS

- County Land Conservation Departments (Directory Link) http://www.datcp.state.wi.us/arm/agriculture/land-water/conservation/pdf/ar-pub-119web_dec2005.pdf
- River Alliance http://www.wisconsinrivers.org/
- USDA Farm Service Agency http://www.fsa.usda.gov/wi/news/default.asp
- US Fish and Wildlife Service http://www.fws.gov/midwest/maps/wisconsin.htm
- UW Cooperative Extension http://www.uwex.edu/ces/ and http://basineducation.uwex.edu/
- Wisconsin Department of Agriculture, Trade, and Consumer Protection http://www.datcp.state.wi.us
- Wisconsin Department of Natural Resources http://dnr.wi.gov/



FOOTNOTES/BIBLIOGRAPHY

All data is provided "as is." There are no warranties, express or implied, including the warranty of fitness for a particular purpose, accompanying this document. Use for general planning purposes only.

- 1. Introduction and the description of resource concerns of the Pensaukee River Basin were derived from a report issued by the Wisconsin Department of Natural Resources titled "The State of the Basin Reports", 4/12, WDNR.
- 2. Common Resource Area (CRA) Map delineations are defined as geographical areas where resource concerns, problems, or treatment needs are similar. It is considered a subdivision of an existing Major Land Resource Area (MLRA) map delineation or polygon. Landscape conditions, soil, climate, human considerations, and other natural resource information are used to determine the geographic boundaries of a Common Resource Area.

 Online linkage: http://soils.usda.gov/survey/geography/cra.html.
- 3. The relief map was created using the National Elevation Dataset (NED) 1 arc second, approximately 30 meters, digital elevation model (DEM) raster product assembled by the U.S. Geological Survey (USGS). A hillshade grid was derived from the 30m DEM and draped over the DEM to symbolize the map and create a 3-D effect. The data was downloaded from the NRCS Geospatial Data Gateway http://datagateway.nrcs.usda.gov/. For more information about NED visit http://ned.usgs.gov/.
- 4. Average Annual Precipitation data was originated by Chris Daly of Oregon State University and George Taylor of the Oregon Climate Service at Oregon State University and published by the Water and Climate Center of the Natural Resources Conservation Service in 1998. Annual precipitation data was derived from the climatological period of 1961-1990. Parameter-elevation Regressions on Independent Slopes Model (PRISM) derived raster data is the underlying data set from which the polygons and vectors were created. For more information about PRISM visit http://www.ocs.orst.edu/prism/prism_new.html. Precipitation data was downloaded from the NRCS Geospatial Data Gateway http://datagateway.nrcs.usda.gov/.
- 5 The Land Use/Land Cover data was generated from the National Land Cover Dataset (NLCD) compiled from Landsat satellite TM imagery (circa 1992) with a spatial resolution of 30 meters and supplemented by various ancillary data (where available). The data was assembled by the USGS and published in June of 1999. The analysis and interpretation of the satellite imagery was conducted using very large, sometimes multi-state image mosaics. For more information about NLCD visit http://edcwww.cr.usgs.gov/programs/lccp/nationallandcover.html. The data was downloaded from the NRCS Geospatial Data Gateway http://datagateway.nrcs.usda.gov/.

6. 303(d) listed streams were derived from the Water Quality Standards Section of the



Wisconsin Department of Natural Resources (WIDNR) website: http://dnr.wi.gov/org/water/wm/wqs/303d/Lists303d/Approved_2004_303(d)_list.pdf. For more information about the individual sub-watersheds visit http://dnr.wi.gov/org/gmu/gpsp/gpbasin/index.htm. For a list and explanation of Outstanding and Exceptional Resource Waters visit: http://dnr.wi.gov/org/water/wm/wqs/orwerw/.

7. Soil Survey Geographic Database (SSURGO) tabular and spatial data were downloaded for the following surveys:

Brown Co., WI (WI009) Published 2006 03 03

Oconto Co., WI (WI083) Published 2006 11 28

Outagamie Co, WI (WI087) Published 2006 01 20

Shawano Co., WI (WI027) Published 2006 01 20

Metadata and SSURGO data for the aforementioned surveys were downloaded from the NRCS Soil Data Mart at http://soildatamart.nrcs.usda.gov. Component and layer tables from the tabular data were linked to the spatial data to derive the soil classifications found in this section. Visit the online Web Soil Survey at http://websoilsurvey.nrcs.usda.gov for official and current USDA soil information as viewable maps and tables.

- 8. Performance Results System (PRS) data was extracted from the PRS homepage by year, conservation systems and practices and Hydrologic Unit Code (HUC) level. HUC level reporting was not available where N/A is listed. For more information on these and other performance reports visit http://ias.sc.egov.usda.gov/prshome/.
- 9. Ag Census data were downloaded from the National Agricultural Statistics Service (NASS) Website and the data were adjusted by percent of HUC in the county. For more information on individual census queries visit the NASS website at http://www.nass.usda.gov/.
- 10. Population ethnicity data were extracted from the Census 2000 Summary File 3 compiled by the U.S. Census Bureau. The data were adjusted by Block Group percentage in the HUC. Population items were selected from the SF30001 table. For more information on census data and definitions visit http://www.census.gov/Press-Release/www/2002/sumfile3.html.
- 11. Urban population and median household income data were derived from the American FactFinder assembled by the U.S. Census Bureau. American FactFinder is a quick source for population, housing, income and geographic data. For other census items and trends visit http://factfinder.census.gov/home/saff/main.html?_lan