

Great Lake Restoration Initiative
Project Update
Thompsons West End Beach

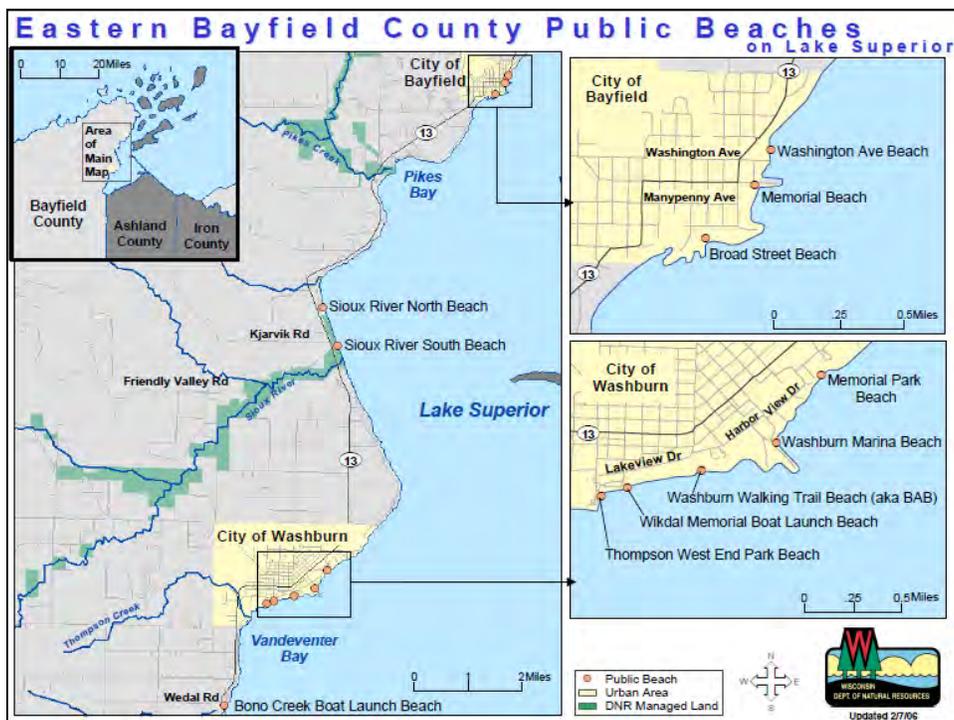
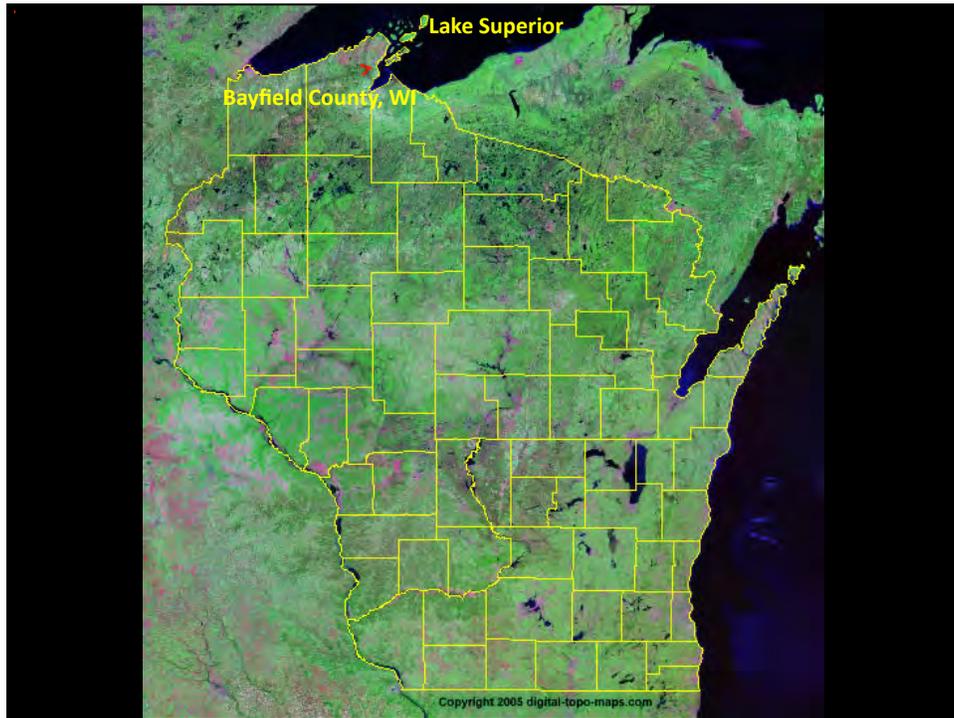
Washburn, WI

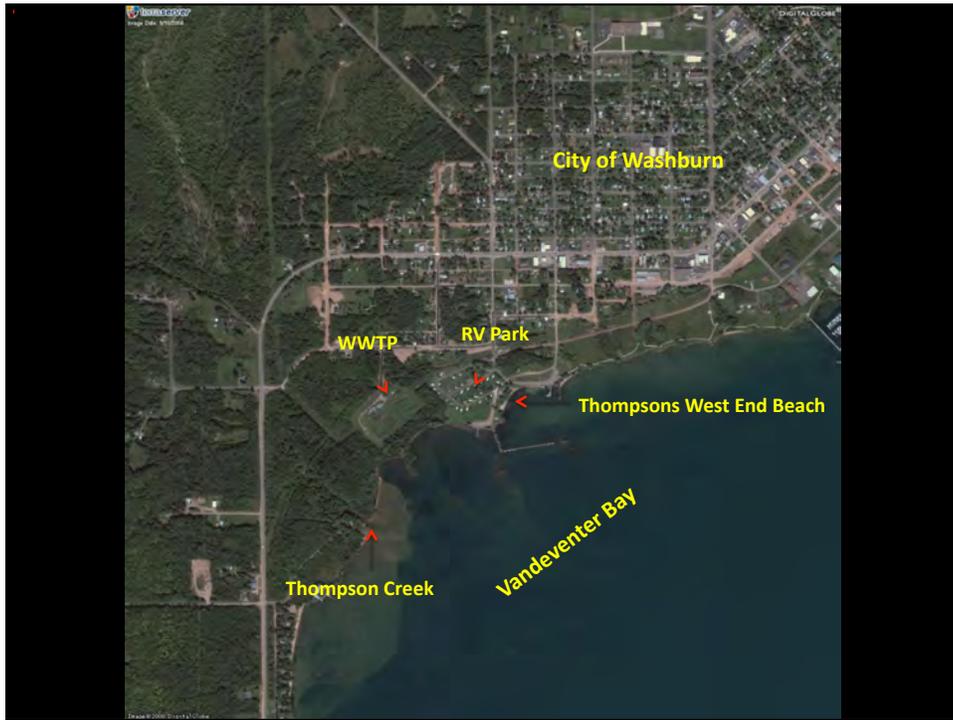
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Summary

- 5 beaches on Lake Superior on 303d Impaired Waters list
- Previously monitored since 2003
 - Limited source identification
 - Some additional sampling in 2006
- GLRI allowed for frequent and expanded monitoring
 - Monitoring 2010-2011 (continuing in 2012)











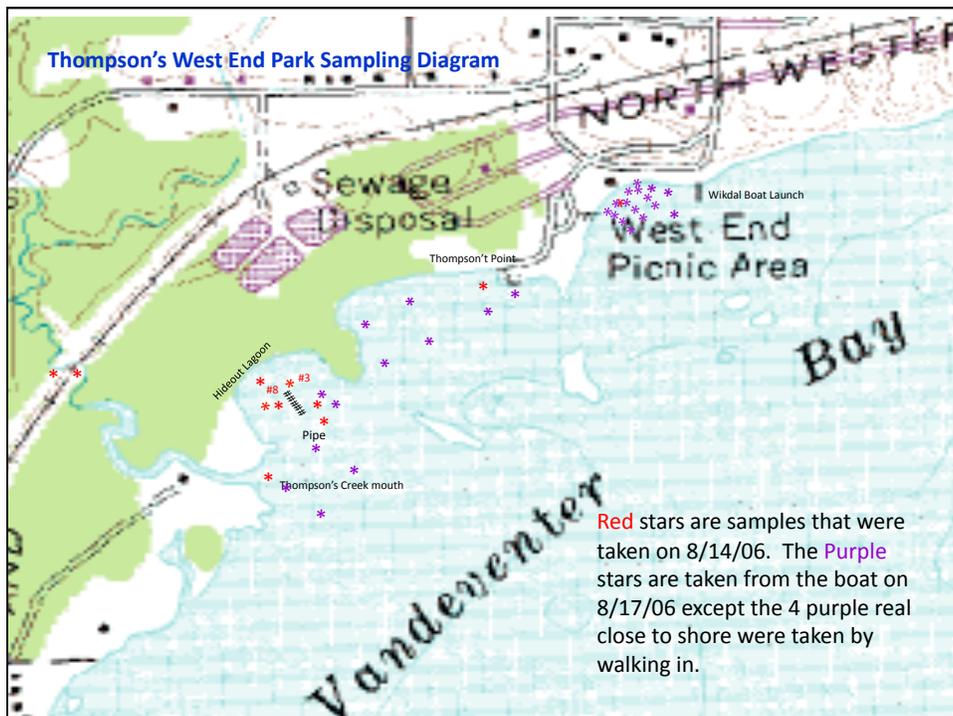


Pipe 1



Historical Water Quality

Thompson West End Park Beach Historical Data				
Number of Samples Exceeding Water Quality Standards				
Year	# of Exceedances	Total Samples	Percent Exceedances	<i>E. coli</i> Average MPN/100mL
2003	0	17	0%	31.5
2004	1	14	7%	97.7
2005	2	16	13%	193.2
2006	7	21	33%	375.4
2007	8	44	18%	227.6
2008	3	27	11%	151
2009	0	16	0%	20.5
2010	9	53	17%	198
2011	8	56	14%	154.7
Totals	38	264	14%	



Thompson's Sampling Results 8/14/2006

Thompson's West @ 2:45 PM 1046.2

Sample 1 (Thompson's creek, behind WWTP off trail) 98.7

Sample 2 (Thompson's creek further down trail) 64.4

Sample 3 Hideout Lagoon (closer to WWTP) 14.5

Sample 4 Hideout Lagoon (On map closest to shore on map) 45.7

Sample 5 Hideout lagoon (Shore side of pipe on map) 9.8

Sample 6 Hideout lagoon (Open water side of pipe on map) 15.8

Sample 7 Sample 8 Mouth of Thompson's Creek 1046.2

Sample 8 Close shore in vegetation (TONS OF IT) 18.5 marked on map star above #

Sample 9 Hideout Lagoon (Further out from pipe) 12.2

Thompson's West @ 4:50 PM 1098.3

Thompson's Point 133.3

Thompson's Sampling Results 8/17/2006

Wikdal Middle of Boat Launch (138 yards off shore about 5' deep) 24.3

Wikdal 24" 14.5 (52 yards off shore)

Wikdal 36" 36.4 (56 yards off shore)

Thompson's Right 24" 4.1

Thompson's Right 36" 32.7

Thompson's Right 48" 14.5

Thompson's Center 24" (50 yards off shore) 59.1

Thompson's Center 36" (53 yards off shore) 50.4

Thompson's Center 48" (131 yards off shore) 1.0

Thompson's Left 24" 37.3 (50 yards off shore)

Thompson's Left 36" 6.3

Thompson's Left 48" <1.0

Thompson's Sampling Results 8/17/2006 Continued

Thompson's Right 24" (from shore) >2419.6
 Thompson's Right Center 24" (from shore) 2419.2
 Thompson's Left Center 24" (from shore) 1732.9
 Thompson's Left 24" (from shore) 143.9
 Thompson's Point Right 24" 7.5
 Thompson's Point Right 36" (100 yards off shore) 8.4
 Thompson's Point Center 24" (same spot sampled on 14th, 5' from dock) 46.5
 Thompson's Point Center 36" 25.6
 Thompson's Point Dock 24" 18.7
 Thompson's Point Dock 36" 28.8
 WWTP Left 24" (31 yards off point by WWTP) 10.8
 WWTP Left 36" 10.8
 WWTP Center (water depth 3' 142 yards off shore) 40.4
 WWTP Center (water depth 4' 150 yards off shore) 32.7
 WWTP Right (Thompson's Creek Mouth 5 to 6' deep 180 yards off shore) 17.5
 WWTP Right (water 6' deep) 8.6



Sanitary Surveys - 2011

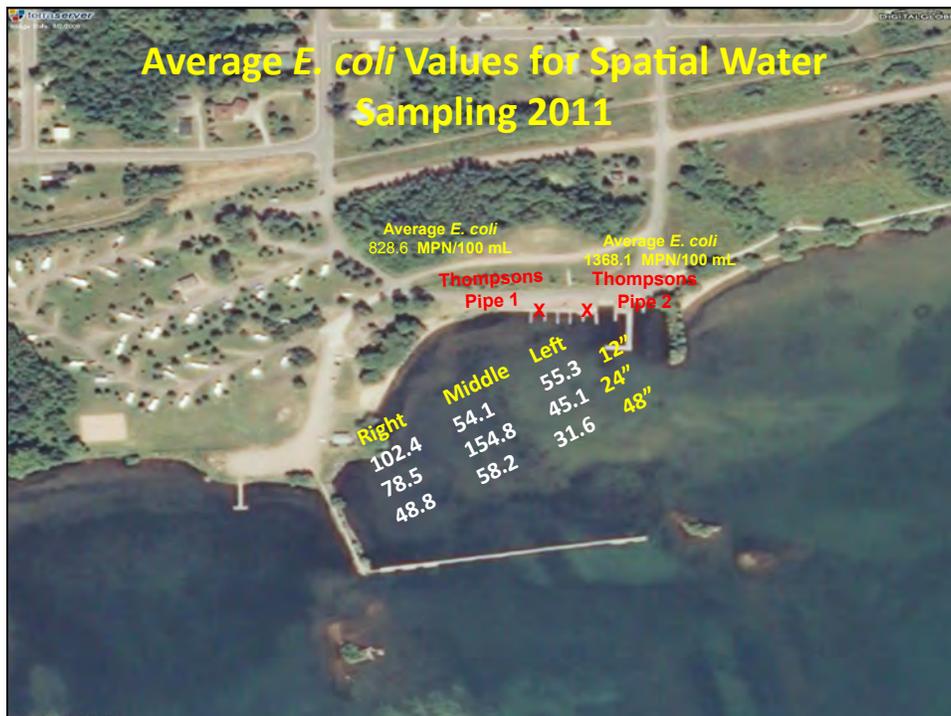
- Water samples were collected from 3 transects (90 days).
- Potential sources of fecal contamination were assessed at least weekly
 - Storm water outfalls, tributary discharge, surface runoff, avian
- All water and sand samples were enumerated for *E. coli*.
- Physical and chemical parameters were measured when water and sand samples were collected
- Spatial water sampling (3X/week biweekly)
 - 3 transects (Left, Center, Right)
 - Depths (12", 24", 48")
- Spatial sand sampling (3X/week biweekly)
 - 3 transects (Left, Center, Right)
 - Upshore, Swashzone, 24"
- Observed *E. coli* concentrations were compared to environmental conditions.

Environmental Data Collected Routine/Daily BSS

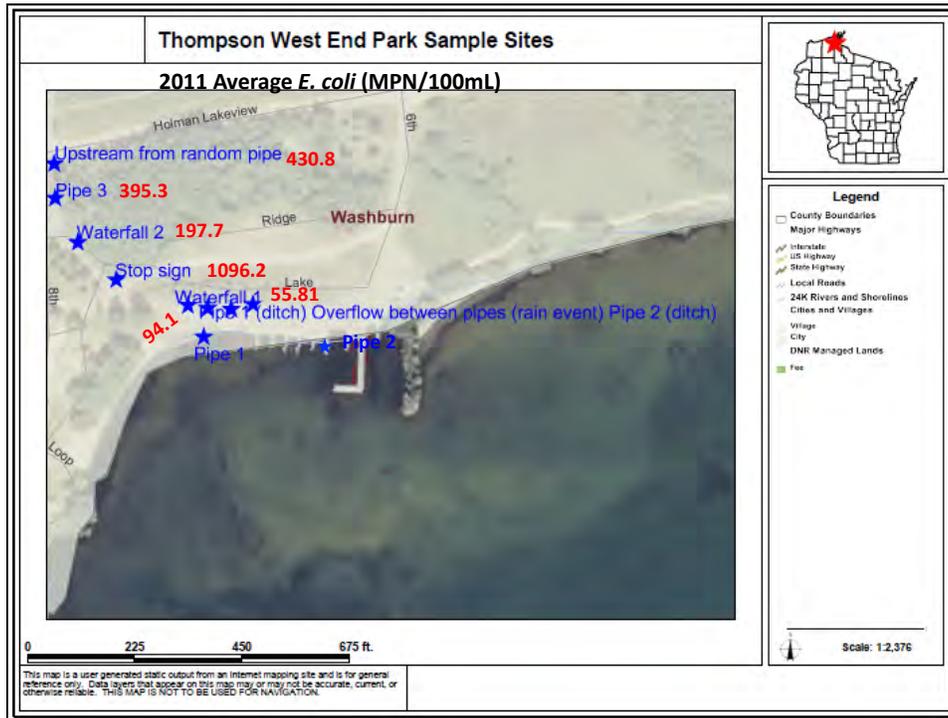
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|---|---|
| <ul style="list-style-type: none"> • General Beach Conditions <ul style="list-style-type: none"> – Air temperature – Wind speed/direction – Rainfall – Weather condition (sunny, etc.) – Current speed/direction – Wave Height • Water Quality <ul style="list-style-type: none"> – FIB concentrations – Water temperature – Water color/odor – Turbidity (clarity) | <ul style="list-style-type: none"> • Bather Load <ul style="list-style-type: none"> – Total number of people at beach – Swimmers/non-swimmers • Potential Pollution Sources <ul style="list-style-type: none"> – Sources of discharge <ul style="list-style-type: none"> • Rivers, outfalls, wetlands, etc. – Floatables – Amount of debris/litter – Amount of algae <ul style="list-style-type: none"> • Stranded on beach • Floating/submerged in water – Presence of wildlife <ul style="list-style-type: none"> • Gull counts • Geese, deer, other – Presence of domestic animals <ul style="list-style-type: none"> • Dogs, Horses |
|---|---|

Physical Attributes

- Length
 - 111.25 meters in length
- Width
 - 19.1 m at left transect
 - 12.2 m at center transect
 - 16.0 m at right transect
- Slope (approximate)
 - 10% at center transect
- Sediment Composition
 - Sandy
 - Average diameter - 0.014 in.
 - Woody debris

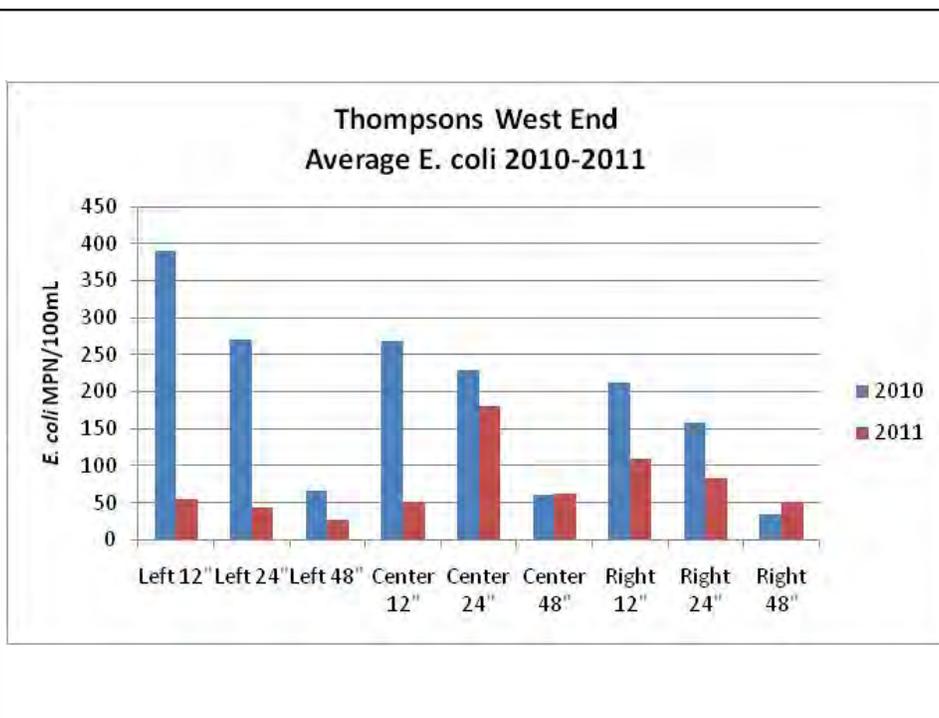






Factors Influencing Water Quality

Parameter	R ² Value with		
	Average	<i>E. coli</i>	Correlation Strength
Wind Direction	SE	N/A	N/A
Wind Speed (mph)	2.1	0.0474	Low
Water Temperature (°C)	17.8	0.1208	Low
Air Temperature (°C)	20.8	0.0081	Very Low
Turbidity (NTU)	1.4	0.0072	Low
Wave Height (in.)	0.78	0.246	Moderate
Weather Conditions (1 = Sunny, 5 = Cloudy)	2.7	0.0258	Low
Longshore Current (cm/s)	2.2	0.0084	Very Low
Longshore Current Direction (Degrees)	113.8	0.1954	Low
Geese Population (compared to beach sand)	8	0.5216	High



Summary

- The beach *E.coli* levels significantly correlate with *E.coli* coming from a stormwater pipe that discharges to the beach area.
- On every occasion there was an elevated *E.coli* level found in the beach water, a corresponding elevated *E.coli* level was found coming from the stormwater pipe.
- Direct runoff from parking lot to beach area.
- Beach area and associate grassy area does not discourage avian species.
- Shallow moist beach sand and shallow beach sand/slope harboring *E.coli*.
- Organic debris harboring *E.coli*.
- No separation between dump station ditch and drainage ditch to beach.

Recommendations

- Develop infiltration treatment systems for stormwater from pipes adjacent to the beach.
- Establish buffer from dump station and direct input to beach area.
- Nourish beach with appropriate sand to decrease capillary action, dry beach, and decrease the size of the swashzone.
- Establish beach maintenance program and BMPs.
- Establish vegetative barrier from parking lot to beach to deter avian species and provide barrier to overland flow of water.

Sanitary Survey Success Story

Rural Beach Remediation
Egg Harbor, WI

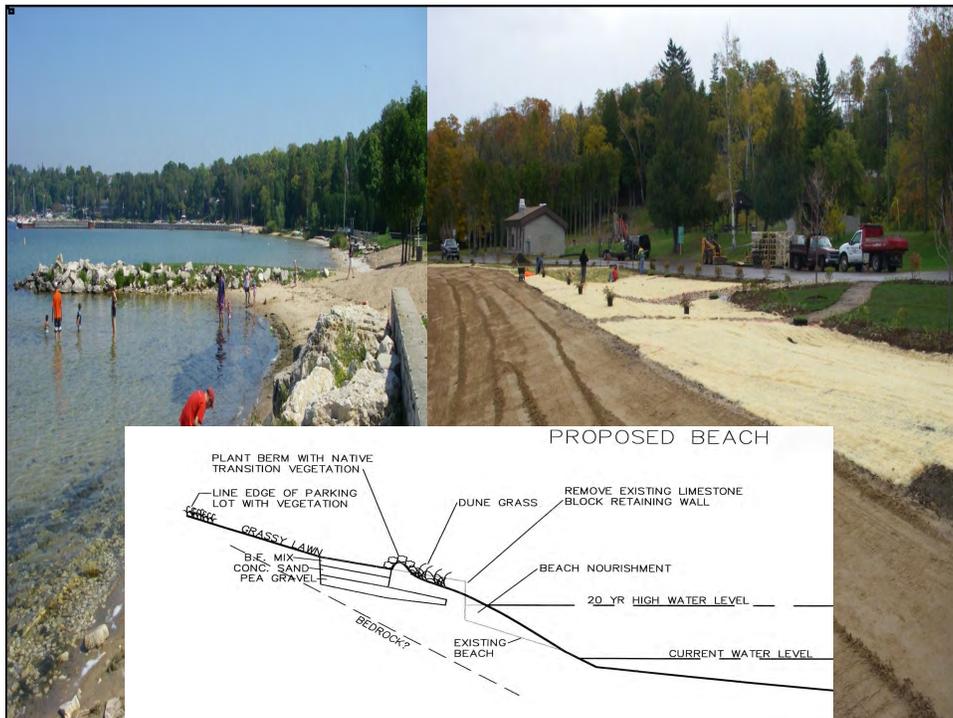
BEFORE: Low, flat beach with large swash zone.
Rock jetties reduce water movement.



BEFORE: Low, flat beach with large swash zone. Large populations of waterfowl consistently utilizing beach area.









DURING CONSTRUCTION: Beach is nourished to minimize swash zone and improve infiltration. Native plantings are used to hold sand in place and discourage waterfowl. Stormwater runoff is treated through infiltration and bio-infiltration prior to entering the sandy beach area.



AFTER: Boardwalks and pathways direct beachgoers to sandy beach area with minimal disturbance to vegetation.



AFTER: Beach is higher and drier as a result of beach nourishment.



- Egg Harbor was recently selected to be “Best Small Town” in Wisconsin in a survey by Wisconsin Trails magazine.

A new beach and marina optimize the sparkling waters of Green Bay.” – Jeff Larson, Green Bay “Right on the lake, beautiful scenery, and easy access to all of Door County’s offerings, including theater, wineries, shopping, galleries. It’s a great vacation destination and the people are friendly.

– Sue Johnston, Jackson

★ BEST SMALL TOWN ★
Door County was recently named the "Best Small-Town Gateway in the Midwest" by Midwest Living magazine.

★ TOP TEN VACATION DESTINATION ★
One of the top ten vacation destinations in North America.
- Money Magazine

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Top Ten Vacation Destination
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- Money Magazine



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