



# North Shore Management Board

## Ridgeline Viewsheds

### PROJECT DISCIPTION

The North Shore Management Board is a ten-member Joint Powers Board that contains a representative from all local units of government that exercise zoning authority on the North Shore of Lake Superior. This Board implements the North Shore Management Plan, a document that sets the minimum standards and criteria for the subdivision, use, and development of the shoreland of Lake Superior. The North Shore Management Plan area boundary is defined along the 40-acre subdivision lines of the rectangular coordinate system established in the U.S. Public Land Survey, nearest to the landward side of a line 1,000 feet from the shoreline of Lake Superior or 300 feet landward from the center line of Highway 61, whichever is greater. However, the boundary between Lakewood Township and the western corporate limits of Two Harbors is the centerline of the Highway 61 Expressway.

The Regional Priority Projects are projects identified by the North Shore Management Board (NSMB) to help implement the North Shore Management Plan Update. The NSMB agreed that these projects were vital to sustainability on the North Shore. The Plan Update was adopted in June of 2004. Three Regional Priority Projects were funded for FY 2007 by the Minnesota's Lake Superior Coastal Program Grant which include; 1) Node Definition for Comprehensive Plans, 2) North Shore Ridgeline Viewshed Identification and Assessment, and 3) Wastewater Assessment.

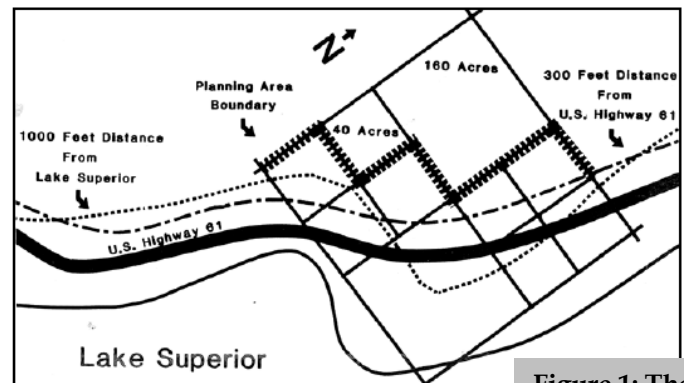


Figure 1: The NSMB Boundary

*This project was funded in part under the Coastal Zone Management Act, by NOAA's Office of Ocean and Coastal Resource Management in conjunction with Minnesota's Lake Superior Coastal Program and by local units of government of the North Shore of Lake Superior*



# Ridgeline Viewsheds

The ridgeline along the North Shore parallels the northwest side Trunk Highway 61. At times the ridge is visible from the roadway, providing travelers with sweeping scenic views of the forest ridge. At other times there are sight obstructions like trees or the ridgeline is simply too far inland to be seen from the highway. This project's goal was to identify where the ridgeline can be seen from TH 61 and to determine if the visible property is publicly or privately owned. The NSMB understands that future protection of these areas might be considered a possibility but stressed the importance of this first step of identifying the viewsheds.

## METHODOLOGY

### Viewshed Definition and Data Collection

The first step of the project was to determine how to identify viewsheds. The ridgeline is the focus of the project so whenever the ridgeline can be seen from a vehicle on Trunk Highway 61 it was considered a viewshed. When traveling Highway 61, the ridgeline is fairly easy to identify.

While traveling north on Highway 61, a GPS waypoint was recorded every time the ridgeline came into view. Additionally, elevation and compass readings were taken. The compass was used to take the degree readings of the beginning of the view of the ridgeline at the same time the waypoint was recorded. Then another waypoint and compass reading was taken where the ridgeline ends. This step was repeated at every viewshed between the City of Duluth and the U.S./Canadian boundary. The same information was collected heading south on Highway 61 because different viewsheds are visible when traveling north or south. Initially, there were 31 viewsheds while traveling north and 30 while traveling south, but several of these overlapped and were later combined.

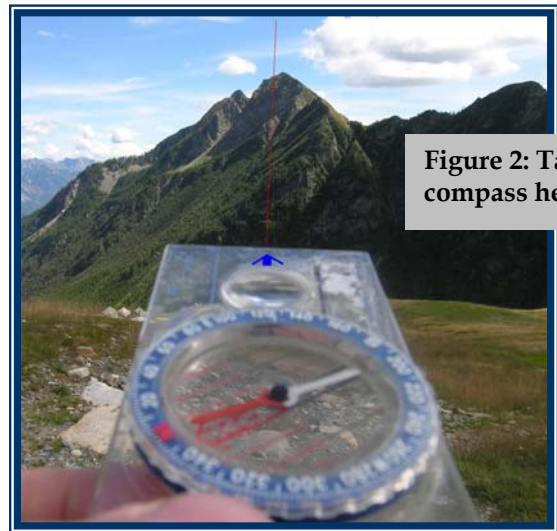


Figure 2: Taking a compass heading

# Ridgeline Viewsheds

## Applying the Data

The waypoints and compass readings were entered into a Geographic Information Systems database. The compass readings were used to show the eastern and western boundaries of the viewshed. This gave a general idea of where the viewshed could be located; however this data did not determine the northern boundary of the ridgeline.

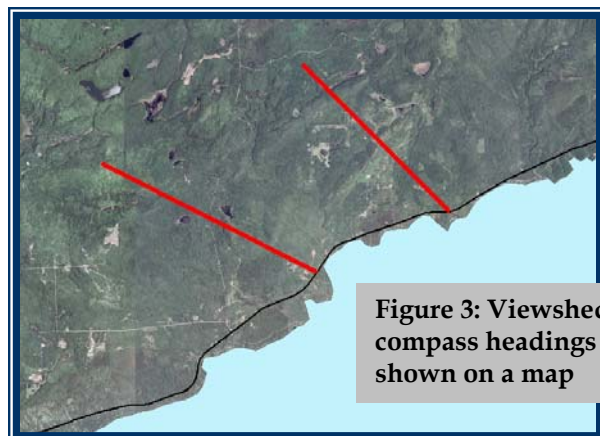


Figure 3: Viewshed compass headings shown on a map

## Ridgeline Location

A contour map was used to determine the northern boundary of the viewsheds. The peak of the ridgeline was located along Highway 61 by referencing contour maps and determining where peak of the grade exists. This elevation was determined to be the end of the viewshed. The polygons represent the land that is within the viewshed area.

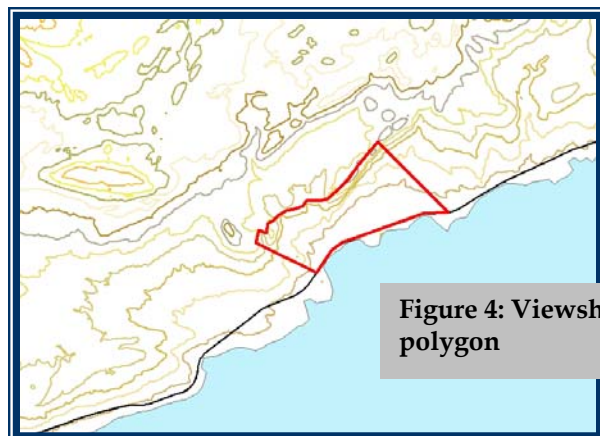


Figure 4: Viewshed polygon

## Land Ownership

The next step in the process is to identify the land ownership of the areas within the viewsheds. Land ownership data was collected from the State of Minnesota. These GIS layers have been generalized. Property ownership is only shown in 40-acre parcels. If a single property owner owns 50 percent of more of the 40-acre parcel the entire parcel is shown to be owned by that entity on the map. ARDC is working with each of the Counties on the North Shore to get a more accurate land ownership data layer, but those layers have not been made available to the NSMB as of June 2007. The generalized land ownership maps were then added as a layer to the polygon viewshed files and a general assessment of each viewshed's ownership could be completed.

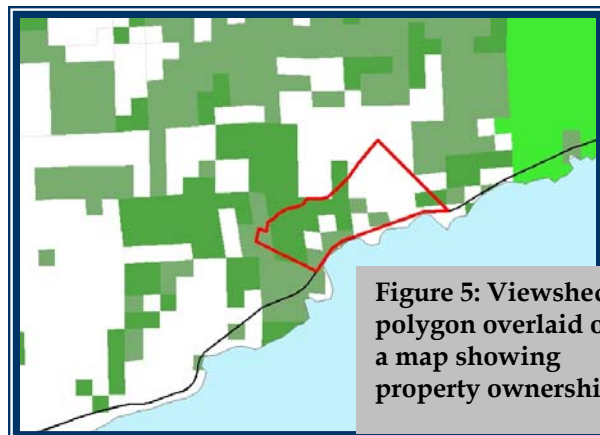


Figure 5: Viewshed polygon overlaid on a map showing property ownership

## Final Products

The NSMB has produced a map showing the information discussed above. That map is on the following pages along with a table describing the general ownership of each viewshed. This data will also be available in an interactive format on the internet. This will allow interested parties to see each viewshed and to see digital pictures of the view. The digital pictures show existing structures and other physical objects within the viewshed.

# Ridgeline Viewsheds

The information has been converted into a GIS layer that the NSMB will forward to the member entities along the North Shore for their use if they choose.

The viewshed areas were broken down into ownership:

Red=75% or more privately owned
Pink=50% or more privately owned
Rose=25% or more privately owned

Viewshed	TOTAL ACRES	County	Federal	Private1	Private2	State	Tribal	Percent Private
1	86.54			86.54	0			100%
2	1032.44	177.67		166.17	688.6			83%
3	345.44	11.84		332.77	0.83			97%
4	4.93			4.93	0			100%
5	230.34	0.01			177.44	52.89		77%
6	200.87				61.49	139.38		31%
7	1663.92	808.74		0.06	0.01	855.11		0%
8	187.49	22.75		16.05	109.12	39.57		67%
9	2848.35	1935.41		15.74	410.92	486.28		15%
10	2750.67	423.64		270.49	1957.79	98.75		81%
11	8608.7	1463.62		472.91	1717.18	4954.99		25%
12	464.38			65.97	1.21	397.2		14%
13	3639.21	1342.75		1092.57	347.57	856.32		40%
14	890.52	6.4			707.56	176.56		79%
15	183.3				150.71	32.59		82%
16	14.08			14.08	0			100%
17	136.06		20.83		76.57	38.66		56%
18	14934.87	71.06	7734.87	4022.59	1205.17	1901.18		35%
19	4445.9		1822.72	680.33	361.78	1581.07		23%
20	337.69	58.97	11.57		92.26	174.89		27%
21	10712.8	765.6	4023.08	1317.42	3605.76	1000.94		46%
22	3276.39		1993.71	648.64	549.23	84.81		37%
23	285.69		107.72	58.36	35.32	84.29		33%
24	61.03		27.42	16.87	0.74	16		29%
25	180.83				4.24	176.59		2%
26	1591.47		246.05	462.75	191.72	690.95		41%
27	2162.47		527.96	21.16	230.34	1383.01		12%
28	671.56		43.21		0	11.55	616.8	0%
29	51.32				0		51.32	0%
30	418.22				20.54		397.68	5%
31	11523.22				1424.44	40.23	10058.55	12%
32	1869.08		618.35	81.78	862.17	306.78		51%
33	117.5				95.95	21.55		82%
34	59.63				43.76	15.87		73%
35	32.03				31.04	0.99		97%
36	55.26				53.05	2.21		96%
37	17.42				15.21	2.21		87%
38	3596				3562.9	33.1		99%
39	216.19			216.2	-0.01			100%
40	24.52			24.52	0			100%
41	17.07				14.48	2.59		85%
42	8768.64	2692.12		297.75	2935.66	2843.11		37%
43	68.65			68.65	0			100%
44	163.33				159.34	3.99		98%
45	76.31			0.06	70.69	5.56		93%
46	8.53			6.09	0.26	2.18		74%
47	76.64				44.09	32.55		58%
48	119.09			12.63	20.31	86.15		28%
49	159.31			1.26	30.28	127.77		20%
50	25.21			25.21	0			100%
51	284.45				254.63	29.82		90%
52	31.98			1.97	29.26	0.75		98%
53	154.7				147.64	7.06		95%
54	18.15				18.13	0.02		100%
55	46.79				1.21	45.58		3%
56	43.7				20.44	23.26		47%
57	125.73			103.84	21.89			100%
58	4.37			4.36	0.01			100%
59	11.75			11.75	0			100%
60	29.01			29.01	0			100%
<b>Total</b>	90161.74	9780.58	17177.49	10651.48	22560.93	18866.91	11124.35	37%

# Ridgeline Viewsheds

