Analysis of Existing Resources

The region’s intrinsic qualities combine with the road’s alignment to create the North Shore’s unique sense of character.
Intrinsic Qualities
The National Scenic Byways Program uses six intrinsic qualities to measure the outstanding resources and features that contribute to the character of a road. These six intrinsic qualities include the natural, cultural, historic, archeological, recreational, and scenic resources encountered along the road. For a detailed analysis of the North Shore’s intrinsic qualities please refer to the Appendix. The following is a brief summary of our analysis.

Natural
Geology
The Laurentian Mountains formed 2.7 billion years ago and were soon covered by a vast inland sea which flooded the interior of the continent producing some of the oldest sedimentary rock formations in the world and the iron bearing formations of the Mesabi Iron Range.

Approximately 1 billion years ago the Earth’s crust began to pull apart in a great zone of crustal thinning known as the Midcontinent Rift System. Basaltic lava poured through cracks in the Earth’s surface and spread out on the flat landscape. Hundreds of these lava flows accumulated on top of each other to form the North Shore Volcanic Group. Their combined weight caused the already thin crust to subside, forming the Lake Superior basin and tilting up layers of rock on the edges of the rift system. Magma that cooled underground formed the more resistant, diabase rocks of the Duluth Complex.

Topography
Two million years ago, mile thick glaciers began advancing out of Canada. Four great periods of glacial advance have been identified; the Kansan, Nebraskan, Illinoian, and Wisconsin, each followed by subsequent periods of retreat. Glaciers scoured away the softer sedimentary rocks deposited by the inland seas, exposing the more resistant diabase rocks that now form the rugged hills and ridges of the North Shore.

Hydrology
The streams of the North Shore are generally short and steep, draining small watersheds. They flow southeast to Lake Superior through deep, eroded gorges. Streams near Duluth have no lakes in their headwaters. During snowmelt or heavy rain, floodwaters develop rapidly and run off quickly. During drought, flows are extremely low. Streams to the northeast have a more stable flow, lakes and marshes in their headwaters act as natural regulators retarding high flows during storms and slowly releasing stored water during drought.

Lake Superior and its tributaries are extremely fragile ecosystems that retain their pristine conditions because they have not experienced the same amount of development and pollution as the other Great Lakes. Lake Superior’s deep water concentrates biological communities in the shallow nearshore areas. The lake’s clear water is extremely cold and infertile, resulting in food production rates that are much lower than in other lakes. Non-point source pollution is one of the major threats affecting water quality in Lake Superior. These threats are due to erosion, sedimentation, and run-off from failing septic systems. The Minnesota Pollution Control Agency has identified 36 miles of Minnesota’s shoreline as having high erosion hazard. Approximately 55% of North Shore septic systems are deemed failures as described by Chapter 7080 of the Individual Sewage Treatment Systems Standards.
Original Vegetation
The original vegetation of the North Shore was mostly coniferous forest. The Great Lakes Pine Forest, comprised of white and red pine, paper birch and aspen, occurred on thin glacial till over the underlying bedrock in northern Minnesota. Red pine was more abundant than white pine and occurred on coarsely textured dry sites prone to fire. White pine occurred on the mesic (moist) sites of stream margins and lower slopes less subject to fires. Forest fires created a dynamic ecosystem. Without periodic fires to remove the quick growing aspen and birch, pine saplings are quickly crowded out and denied access to the sunlight they need to survive. Fire opens the ground plane to direct sunlight and exposes the mineral soil seedbed, both of which are necessary requirements for jack pine reproduction. The dry open conditions under the pine canopy allowed for a variety of understory plants such as wintergreen and blueberry. Balsam fir, owing to its great shade tolerance, tends to form extensive stands in the absence of frequent fires. Mixed hardwood maple and pine forests occurred on the cooler, shadier backslopes of the North Shore’s hills and ridges. Conifer bogs also occurred inland, where hills and ridges blocked drainage.

Ecology
Diverse old-growth pine forests only exist in small parcels on the North Shore. Logging and slash fires have created a highly disturbed forest of young, even-aged, second-growth aspen and birch. The suppression of forest fires over the last 100 years has halted the natural cycle of regeneration even in areas that have not been logged. Nonetheless, rare plant communities and animal nesting sites occur with great frequency along the North Shore. State Parks, National and State Forests, and wetlands provide critical habitat along the rocky shoreline. Habitat is especially critical to birds that must go around rather than across the expanse of Lake Superior on their migratory flights. The abundance of rocky cliffs minimizes the nesting habitat available for waterfowl and shorebirds. Stream trout and anadromous trout from Lake Superior use the streams and rivers of the North Shore to spawn and reproduce. State Parks are managed for their habitat value and provide corridors for the movement of birds and animals between the shore of Lake Superior and the state and national forests inland.

Cultural
Landuse
The first Native American inhabitants of the North Shore moved in behind the receding glaciers 12,000 years ago. They were hunters who harvested wild rice and berries while following the movements of big game animals. Later tribes began staying in one place long enough to plant squash gardens and to bury their dead in ceremonial mounds. The Lakota (Dakota or Sioux) were gradually pushed west by the displacement of the Anishinabe (Ojibwe or Chippewa) from the east.

European explorers and fur-traders arrived in the late 1600s. French explorers discovered Lake Superior in 1641. The first shipment of furs reached Quebec in 1656. La Verendrye established a fur trading post at Grand Portage in 1731 along Indian trails around the high falls on the Pigeon River. The French ceded Canada to Great Britain in 1763 and British soldiers were stationed at Grand Portage during the American Revolution in 1783 to protect the lucrative trade routes that stretched over 3,000 miles to the Rocky Mountains and beyond. During the annual two-week Rendezvous from 1731 to 1803, Grand Portage was the bustling inland headquarters of a worldwide fur trade.

The Treaty of LaPointe in 1854-5 opened the North Shore to settlement and removed the Anishinabe to reservations. Towns were quickly platted up and down the North Shore. Mineral prospectors rushed in, searching for gold. While no gold was ever discovered, the first shipment of iron ore reached Two Harbors in 1884. By 1910, loggers had harvested the great pine forests they thought were inexhaustible. Logs were floated down North Shore streams into Lake Superior, bound into huge rafts, and towed across the lake to sawmills in Michigan, Wisconsin, and Duluth. The logging industry left in its wake a vast treeless region further desolated by fires in 1910, 1913, and 1926. Fishing was a necessity for subsistence in the early days on the North Shore. Commercial fishing became profitable when an increase in shipping on the Great Lakes and the development of railroad networks made it possible to get fresh fish to markets in growing population
ANALYSIS OF EXISTING RESOURCES

Cultural (continued)

centers. The Civilian Conservation Corps put many unemployed young men to work replanting forests and building state parks during the Great Depression. A method for processing low-grade taconite ore was developed by the University of Minnesota during the economic boom years following World War II as the supply of high-grade iron ore ran out. Today tourism is the leading economic activity on the North Shore.

Development
Historically, communities nestled into the rugged North Shore had more of a connection to the land or the lake than they did to each other. Finnish, Swedish, Norwegian and German communities were isolated from each other as much by the rugged landscape as they were by language. Frequent river gorges and impenetrable forests made travel along the shore nearly impossible. Most communities were accessible only by boat until the completion of the Lake Superior International Highway in 1924. Communities prospered or perished based on the availability of inland natural resources, including iron ore deposits, harvestable lumber, and the presence of game birds, animals, and fish.

Infrastructure
The rugged nature of the North Shore limits the construction of infrastructure. The North Shore Scenic Drive is the only road connecting the communities of the North Shore. Railroads extend up the North Shore only to Two Harbors, except for iron ore shipments to Silver Bay and Taconite Harbor. Loading docks for ore boats occur in Two Harbors, Silver Bay, and Taconite Harbor. Public Access Boat Launches on Lake Superior are maintained in Two Harbors, Twin Points, Silver Bay Marina, Taconite Harbor, Schroeder, Tofte, Grand Marais, Hovland, Horseshoe Bay, and Grand Portage. Municipal sewage treatment lagoons exist in Two Harbors, Beaver Bay, Lutsen, and Grand Marais. Airports serve the communities of Two Harbors, Beaver Bay, Tofte, and Grand Marais. Inland roads are infrequent.

Land Ownership
As much as 90% of the arrowhead region is publicly owned, but only 10% of the North Shore is public. State Parks provide valuable access to Lake Superior and the North Shore’s streams, waterfalls, and forests for the general public. Every parcel of public land listed in the county plat books was identified along the North Shore Scenic Drive for its potential to provide recreational opportunities and to provide access to Lake Superior.

Historic
A wide variety of historic structures have been designated along the North Shore including churches, cemeteries, abandoned CCC camps, logging camps, lighthouses, iron ore loading docks, locomotives, train depots, tugboats, shipwrecks, fishing piers, farm buildings, fur trade stockades, log lodges, missionary camps, and Native American sites reflecting the broad scope of human industries and occupations on the North Shore. Historic structures, cultural festivals, and public gatherings reinforce the settlement pattern, occurring mainly in the historic communities of the North Shore. Silver Bay, the newest community on the North Shore in 1955, has no historic structures.
**Archeological**

Archeological sites exist in multiple locations along the North Shore and testify to the existence of previous cultures in the landscape. Due to the sensitive nature of archeological sites, their exact locations are not revealed. The most extensive archeological excavations on the North Shore have occurred at Grand Portage and Fort Charlotte in 1936-7 and again in 1961.

**Recreational**

There are several regional trails that parallel the shoreline including the North Shore State Trail, Lake Superior Hiking Trail, Lake Superior Water Trail, and Gitchi Gami State Bike Trail. Other recreational opportunities tend to be concentrated in population centers, especially in and around Silver Bay and Lutsen. Silver Bay trails are more popular with local residents, while the trails at Lutsen are more frequented by visitors. The string of magnificent state parks offers additional recreational opportunities. Public Water Boat Launches provide access to Lake Superior and numerous inland lakes. Inland roads like Highway 1, the Sawbill Trail, Caribou Trail, Arrowhead Trail, and Gunflint Trail provide access to Superior National Forest and the Boundary Waters Canoe Area.

**Scenic**

The North Shore provides a diverse mixture of high quality scenic views of the lake and its surrounding landforms. Scenic quality is directly related to landform and landcover. Scenic views may be comprised of distant vistas out over Lake Superior, or intimate views of the forests, waterfalls, and cliffs in the irregular shoreline. These scenic views help differentiate and define the distinct character of the North Shore. Every scenic view of Lake Superior and its surrounding landforms was inventoried up and down the entire length of the North Shore Scenic Drive, including whether the view is clear or filtered through vegetation. Significant scenic views occur, on average, every quarter mile along the length of the entire corridor and continually reveal the North Shore Scenic Drive All-American Road’s unique character.
Landscape Character

Character creates a sense of identity. Character is important because the landscape’s unique qualities serve to distinguish it from everywhere else on earth and make it stand out in your memory. The North Shore’s unique character is due to the interaction and combination of its natural and cultural intrinsic qualities, the compositional sum of its parts. It is also tied to the alignment of the road and how it determines your horizontal and vertical experience of the land, water, and vegetation.

Residents and travelers alike, enjoy the rugged, historic, outdoorsy character of the North Shore. It is in short supply in our modern and developed society. People are willing to travel great distances to experience it firsthand. It is important that as we build the infrastructure necessary to support the growing numbers of residents and travelers, we don’t alter the character that attracts everyone in the first place.

The character of the North Shore is, in part, related to its landform and landcover. The presence of volcanic intrusions brings jagged bedrock outcroppings up to the surface of the earth, creating the rugged topography of hills, ridges, cliffs, and mountains typical of the North Shore. Glaciers scraped away a billion years worth of sedimentary deposits that accumulated on top of the volcanic intrusions leaving the bare, rough, volcanic rock exposed at the earth’s surface. A thin layer of soil covers the bedrock and supports the Great Lakes Pine Forests of northern Minnesota.

Lake Superior is the world’s largest freshwater lake. Lake Superior interacts dramatically with the landform and landcover of the North Shore. The North Shore of Lake Superior is one of the few coastlines in the world with such a dramatic elevational drop to the shore. Volcanic intrusions and lava flows create a dramatic shoreline with craggy points and bays, rugged headlands, rocky cliffs, and plunging waterfalls. The high relief landform creates numerous opportunities for viewing other rocky outcroppings and the ever-changing conditions of Lake Superior’s vast waters.

Human activities contribute to the sense of character as well. The presence of historic structures and the visible remains of past industries and ways of life enhances the sense of connection to the land and its past. The building styles of the North Shore reflect the German, Swiss, and Scandinavian backgrounds of its early settlers who had to make do with what was on hand. The use of natural building materials from local sources further enhances the North Shore’s unique sense of place and strengthens the connection to it.

The North Shore provides a diverse mixture of intrinsic qualities. Unique combinations of intrinsic qualities occur at different locations along the North Shore to help differentiate and define distinct character districts. In general, the North Shore is a rugged and rocky shoreline with frequent outcroppings of bare rock that may be visible from great distances or offer distant views out over the forests or Lake Superior. Water cascading over bare rock outcroppings often erodes deep canyons and steep cliffs. Local differences in these general patterns create different districts along the North Shore, each with its own slightly different sense of character.
Typical features that may be visible along the North Shore include: the crenulated shoreline with coves and peninsulas, cliffs, bluffs, road cuts, forests, river valleys, river mouths, and human settlements as seen in the drawing of Beaver Bay at right.
Road Layout
Another, less obvious, intrinsic quality of the North Shore is the physical properties of the road itself. How the road moves through the landscape has powerful impacts on your perception and determines your horizontal and vertical experiences of the land, water, and vegetation. How close the road was built to the water’s edge, and how deep it goes through the forest, will determine what you see. The physical properties of a road’s layout can generally be described in two ways; its profile and its alignment. The profile is its vertical dimension, the alignment is its horizontal dimension.

The vertical ups and downs of a road affect your experience of landform topography. High points offer the opportunity for scenic overlooks. Low points offer the opportunity to get down close to the water’s edge at the shoreline or a river crossing. Cutting down through the high points and filling in the low points to level the road, reduces the range of experiences for travelers. Without scenic overlooks and panoramic views of Lake Superior, or intimate river crossings and rocky shorelines, the character of the road is reduced. Flat roads lose their connection to the rugged landscape and have less variety and visual stimulation for travelers, who pass through a modified version of the landscape instead of engaging its original form.

If a road winds horizontally through the landscape, the view will constantly be directed at what is off to either side of the road. The straighter the road, the more the view is directed at the pavement and vehicles directly ahead of you. The horizontal width of the roadway also affects the sense of enclosure and exposure. It determines the intimacy of the relationship with roadside vegetation and rock outcroppings. A narrow, winding road provides a more intimate experience of the landscape’s character. The journey is visually stimulating and subtle changes in the landscape are noticeable. The traveler feels engaged with the character of the land. Wide roads lose their connection to the unique character of the local landscape.

Preserving the visual character of the landscape must always be balanced with traveler safety. Sharp turns and steep hills should be minimized. Sightlines should not be obstructed by overgrown vegetation. A safe shoulder should be available for emergency stopping. Yet a road that blasts its way straight through every obstacle in its path no longer embraces the landscape, it alters it. When travelers are not engaged by the landscape, their focus shifts from experiencing its character to traveling through it as fast as they can.

Road Profile
Generating a road’s profile can be a useful tool in understanding the character of that road. A road profile charts the elevation at each point along the road, revealing the ups and downs that occur in the length of the road. An elevational profile of North Shore Scenic Drive All-American Road reveals much information about the driving experience along the North Shore. The first thing that stands out is that the North Shore is not flat. There is great variety in elevation along the length of the road, with almost 600 feet of difference between the road’s highpoint at Mount Josephine and its lowpoint at Paradise Beach. The second thing that stands out is that the North Shore is not the same along its entire length.

From Duluth to Two Harbors, the scenic drive gradually gains in elevation as it moves inland away from the lake to join the expressway as it enters Two Harbors. From Two Harbors to Beaver Bay the road is generally low and close to the lake except a few dramatic occasions where it rises up over volcanic intrusions at Silver Creek Cliff, Lafayette Bluff and Split Rock Lighthouse. After Beaver Bay, the road moves inland to avoid the rugged Beaver Bay intrusions along the shore which include Palisade Head. This stretch of road is at a higher average elevation and is generally smoother, with fewer extreme elevation changes. The road through Tofte and Grand Marais returns to the shoreline. It is flattest here, traveling on an old beach terrace past the Sawtooth Mountains which rise up inland from the shore. From Grand Marais to Hovland, the volcanic intrusions occur much further inland and the road drops right down to the water’s edge. Beaches replace rocky cliffs in this stretch. Beyond Hovland, the vertical fins of the Logan Formation create the most dramatic scenery in all of Minnesota as the road rises up over Mount Josephine at Grand Portage.
This graph shows the elevational profile of the North Shore Scenic Drive All-American Road as it travels 150 miles from Duluth to Grand Portage.

- NSSD 61 mile posts are shown in red text
- River crossings are shown in blue
- Communities are shown in red
- State Parks are shown in dark green
- Vertical exaggeration is 100x
**Road Alignment**

The North Shore Scenic Drive All-American Road represents an investment in the fabric of the North Shore. Road-building is an art and a science. Decisions were made in aligning the road that have lasting impacts on our driving experience today. As the road leads us through the landscape, its interaction with landforms, vegetation, waterfalls and the shoreline influences our experience of the North Shore.

The road determines how close we are to the edge of Lake Superior, or how high above it. It presents us with views of rocky cliffs and thundering waterfalls. It leads us through historic communities and deep into the woods. The road determines what hills we go around and what hills we drive up over, or tunnel through. Roadside vegetation frames our views and creates a sense of enclosure. Road width affects your sense of exposure. Driving a 6-lane divided expressway is a very different experience from driving a narrow, twisting 2-lane country road.

The North Shore Scenic Drive was the sixth road to receive All-American Road status. It is currently one of 29 All-American Roads designated as the most scenic drives in the nation. Road alignment along such a specially designated class of road should take special considerations into account to preserve not only safety and traffic efficiency, but also its scenic character. The North Shore Scenic Drive All-American Road provides a variety of experiences, a sequence of unique vistas and viewing opportunities. It winds down along the beach for close-up, intimate views of Lake Superior’s bays and coves. It climbs up over steep bluffs with panoramic vistas to the lake and its distant shore. It blasts its way through narrow road cuts and leaves the shoreline to travel deep into the forest. It is the variety of experiences that makes the North Shore such a scenic drive.

**Landform**

The shape of the earth’s landforms contributes to your sense of enclosure or exposure on the road. A stretch of road along a flat, wide open beach creates a feeling of exposure and provides panoramic views of Lake Superior. A narrow, winding stretch of road through tall rock cuts creates more of a feeling of enclosure and intimate views of the rock face. The variety of landform conditions along the North Shore contributes to the variety of driving experiences.
Landform Creating a Sense of Enclosure at a Rock Cut
Vegetation
The presence of roadside vegetation also contributes to your sense of enclosure or exposure on the road. A straight stretch of road with wide shoulders and the vegetation cleared back from the edge of the road creates a feeling of exposure as well as increased safety from deer and other animal/auto accidents (MNDOT requires a 45’ clear zone for 55 mph). A narrow stretch of road winding through a forest of tall trees at the edge of the road creates more of a feeling of enclosure. It is not that enclosure is good and exposure is bad, but that the two alternate along the North Shore. The variety of forest conditions along the North Shore contributes to the variety of driving experiences.

Driving the North Shore Scenic Drive All-American Road is not the same experience along its entire length, but is a constantly changing experience as the landscape reveals itself around each bend in the road. Future decisions about the roadway should preserve this variety. Passing lanes are a necessity, from time to time, but if we straighten and widen the entire length of road, it will lose its character. It is the sense of the unknown, the mystery of what lies unseen, beyond the bend in the road that propels us forward in our desire to acquire new experiences. Where else in the midwest can you drive over mountains, or tunnel through them, along the coast of the world’s largest fresh water inland sea?
Roadside Vegetation Creates a Sense of Enclosure
Aesthetics

Adding vegetation to the roadside corridor may in some cases improve the scenic quality of the road. The proximity of the forest edge to the edge of the road affects your sense of enclosure and exposure. In areas where too much vegetation has been removed from the edge of the road, the only thing to look at is the pavement and vehicles ahead of you. Planting vegetation at the edge of the road is an effective tool for increasing the aesthetics in some stretches of road. It may also help calm traffic. When all you can see is the open road in front of you, the tendency is to maximize your speed. With roadside vegetation up close enough to see, and to block your view of conditions around the bend in the road, the tendency is to slow down and take in the sights.
The Effects of Adding Vegetation to Improve Road Corridor Aesthetics
Content

The content of scenic views along the road has variety as well. The North Shore Scenic Drive All-American Road provides a mixture of natural and cultural viewing opportunities. Attractive views of waterfalls and cliffs are interspersed with views of historic lighthouses, harborfronts, churches, and towns. The blend of natural and cultural vistas is pleasing. Every effort should be made to preserve natural views as more and more of the North Shore becomes developed, in order to maintain the scenic quality and experience of driving the North Shore Scenic All-American Road.
Natural Viewing Opportunities
“Simplicity in all things is one of the secrets of the wilderness.”
- Sigurd Olson

“The most beautiful experience we can have is the mysterious.”
- Albert Einstein