

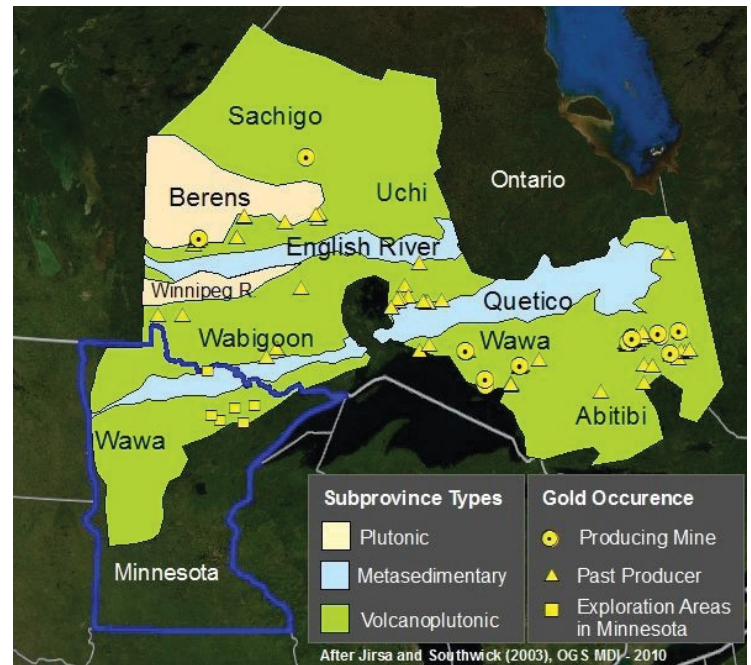
# Explore Minnesota: GOLD

## Minnesota's Golden Potential

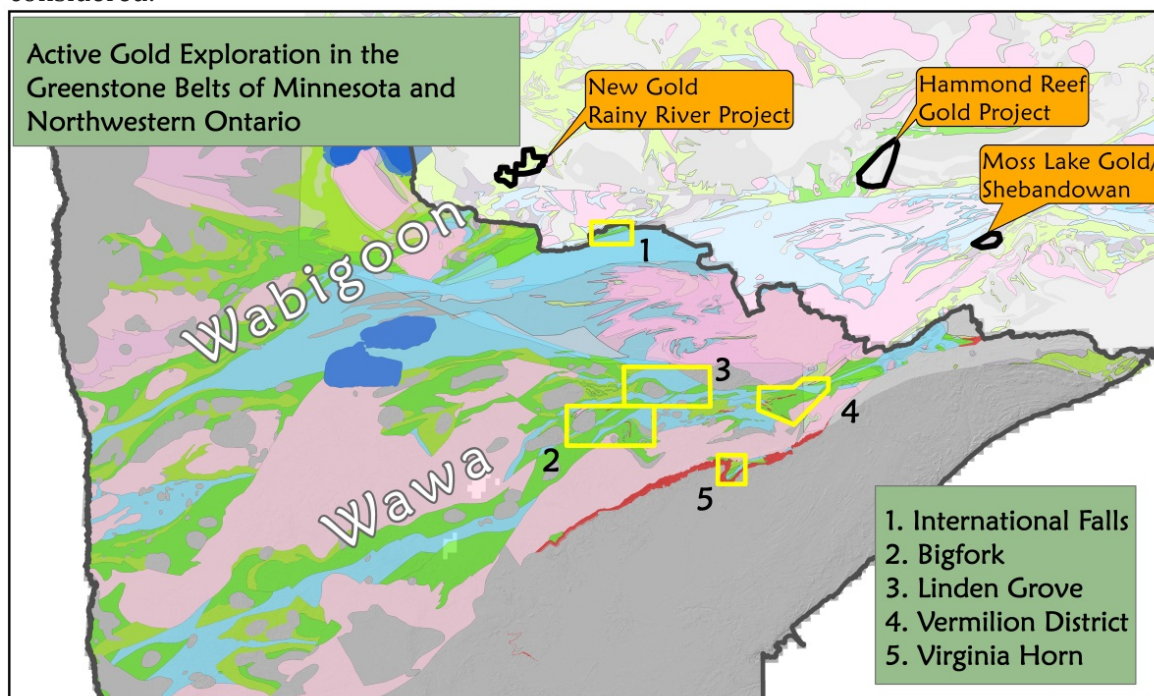


*Exploration companies are actively leasing gold prospects on state-owned mineral leases in Minnesota's Superior Province granite-greenstone terranes.*

The Archean Superior Province greenstone belts that host many of Canada's richest gold camps continue along strike across the U.S. border and into the northern portion of Minnesota. The potential for gold production in Minnesota's portions of the Wawa and Wabigoon Subprovinces is excellent, and the exploration models used for nearby gold deposits in Northwestern Ontario (e.g. Rainy River, Hammond Reef, Moss Lake/Shebandowan), should be considered.



Overburden thickness and composition in Minnesota range from thin layers of glacial drift in the northeast, to saprolite buried under more than 100 meters of glacial deposits in the northcentral part of the State. The possibility of supergene enrichment within saprolitic zones adds to the list of viable ore deposit models, and expands the area of viable greenstone belt gold exploration.



After MGS (2011) and OGS (2003)

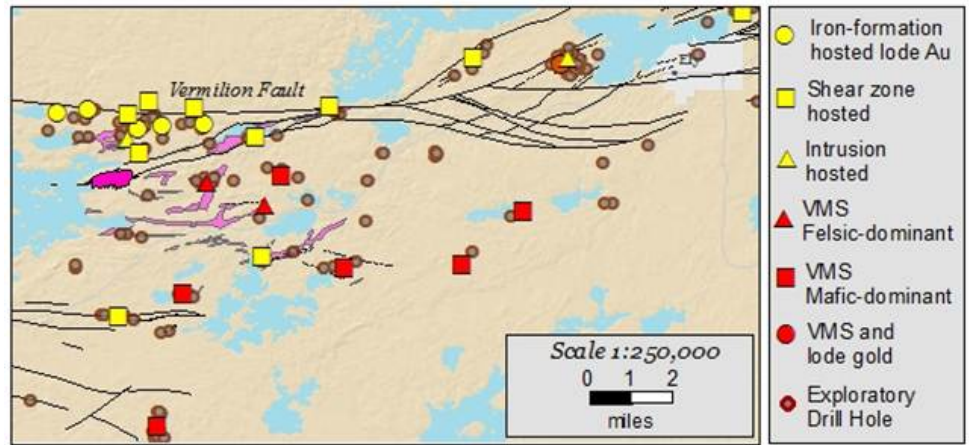


Visible gold grain in a Virginia Horn quartz-feldspar porphyry drill core that has 77.9 gpt/2.3 ft. Photo courtesy of Vermillion Gold LLC



# History of Gold Exploration in Minnesota

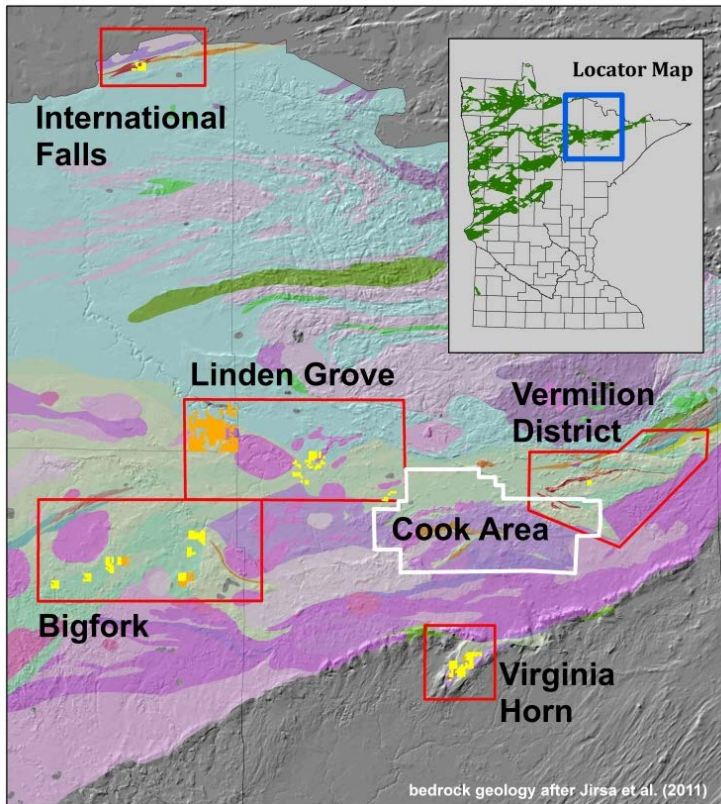
The Archean greenstone belts of Minnesota are considerably under-explored, compared to greenstone belts along strike in Ontario or Quebec. There was an active round of gold exploration and drilling programs during the 1980's that identified several gold prospects in six distinct areas (see below). There has been very little gold exploration activity when measured in terms of numbers of drill holes since that time.



Gold prospects and showings identified during historic exploration and drilling within the Vermilion District (see location below). Gold mineralization is hosted within a wide range of geologic environments, including quartz-feldspar porphyries and late intrusives (pink) within the greenstone terrane. Modified from Peterson and Jirsa (1999) MGS Map M-98



Drill core from the Bigfork Exploration Area. Gold-bearing iron formation with 5.3 gpt/5 ft. (Photo courtesy of Vermillion Gold LLC).



Areas of active (yellow) and pending (orange) gold exploration areas on state-leased lands. There are other active mineral leases in the region (not shown) associated with taconite mining and the Duluth Complex. The DNR's Cook Project Area is an area of historical mineral exploration with newly-recognized bedrock gold potential based on the results of an on-going gold-in-till survey (see right).

## Active Gold Exploration

Vermillion Gold LLC, which is exploring multiple areas within Minnesota's Archean greenstone belts, completed seven drill holes at its Virginia Horn prospect (see map at left) in November 2015. Vermillion has also drilled at its on-going Bigfork prospect (see core above).

## Land Available to Explore

The State of Minnesota manages more than 12 million acres of mineral rights. Much of this is trust-owned land, and the MN DNR manages these mineral rights in the best interest of the Trusts. Private companies can explore for mineral deposits on these lands by obtaining a mineral exploration lease. A number of private mineral rights owners also offer leases on large land holdings. There are ample lands available to lease over Archean Superior Province greenstone belts, and an exploration company could assemble a land package to search for a mining camp-scale cluster of gold mines along a prospective trend.



[http://www.dnr.state.mn.us/lands\\_minerals/mineral\\_faqs.html](http://www.dnr.state.mn.us/lands_minerals/mineral_faqs.html)



## Drill Core and Exploration Data

Minnesota's Drill Core Library is a modern, heated facility that provides public access to more than 3 million feet of drill core from thousands of drill holes. Historic mineral exploration data from State-owned lands is available on-line or in hard copy within an assessment file system. The State of Minnesota continues to build a searchable, on-line information data base of geochemical and geophysical surveys, regional and statewide geology maps, and structural geology reports. There is a statewide aeromagnetic layer. There are glacial drift gold anomalies that have not yet been traced to a bedrock source. Gold geochemical anomalies, bed-rock alteration zones, and gold mineralization in bedrock have been identified in some locations.



Photo courtesy of HCC

In 2014, the State of Minnesota awarded a public/private educational partnership a grant of US\$1.4 million to purchase a 793-F Caterpillar haul truck simulator for Hibbing Community College's (HCC) Industrial Systems Technology program.

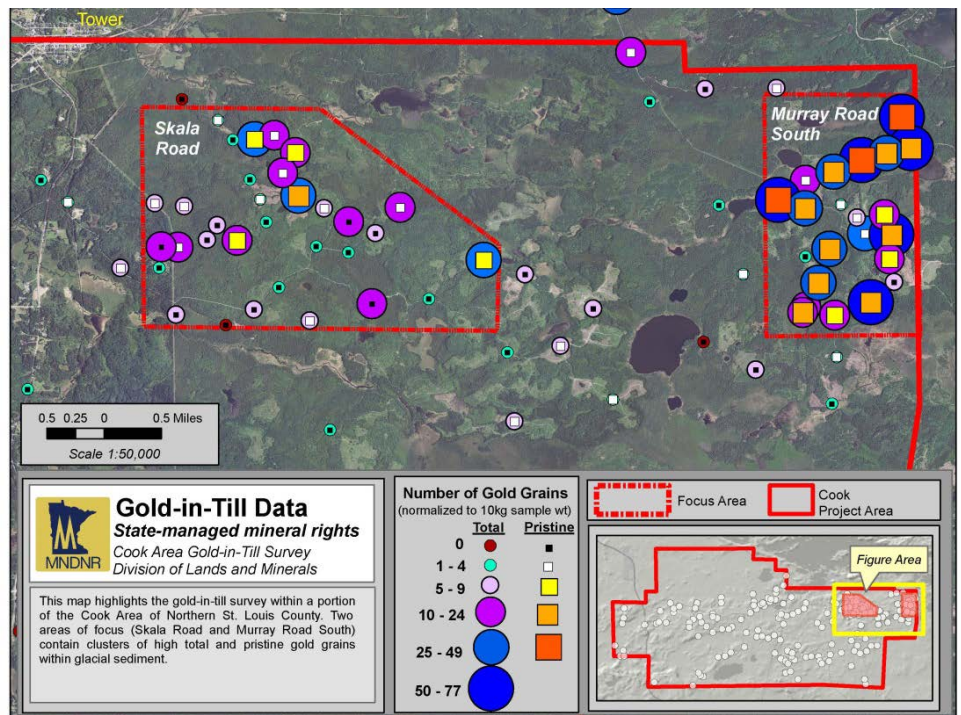
## Cook Area Results

In 2015, the MN DNR identified a previously-unrecognized area of high bedrock gold potential based on the results of an on-going gold-in-till survey within the Cook Area. High total gold grain counts and high percentages of pristine gold grains within glacial sediment samples from both the Skala Road and Murray Road South focus areas strongly suggest a local bedrock source for the gold.

All of the sediment sample locations in these two focus areas were on unsevered state-managed mineral rights that have previously been offered for mineral exploration lease.

## Governance and Infrastructure: 100 Years of Support for Mining

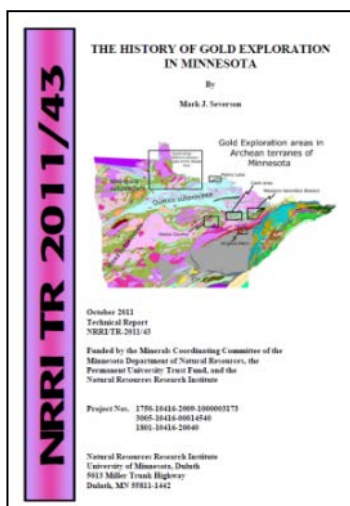
Minnesota offers exploration companies a well-educated work force and a safe, conflict free work zone within a politically stable democracy. Its gold bearing greenstone belts are located near the Canadian border, within a part of the State that has a 100-year tradition of large-scale iron mining. The public school system owns 3.5 million acres of mineral rights, from which it receives mineral royalties. State policy supports mineral diversification. There is a moderate overall taxation policy in comparison to Ontario. The State of Minnesota has also demonstrated willingness to support nonferrous mineral exploration and development by funding technological research by agencies and academic groups.



[http://www.dnr.state.mn.us/lands\\_minerals/mpes\\_projects/project392.html](http://www.dnr.state.mn.us/lands_minerals/mpes_projects/project392.html)

## Historical Review of Gold Exploration in Minnesota

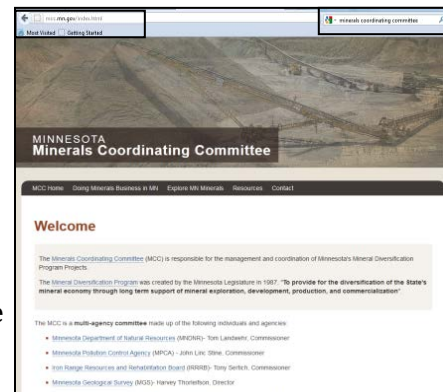
In 2012, the NRRI published [NRRI/TR-2011/43](#), an atlas of gold exploration in the Archean Superior Province rocks of Northern Minnesota. This report compiled available information (maps, assays, reports, etc) for 62 identified orogenic gold prospects within Minnesota's portion of the Wawa and Wabigoon subprovinces.



## Minerals Coordinating Committee web site: [mcc.mn.gov](http://mcc.mn.gov)

The MCC is Minnesota's multi-agency committee charged by statute to provide long-term support of mineral exploration, development and production within the State. In support of this mission, the MCC launched a web site in 2012 that serves as an information clearinghouse for companies interested in exploring Minnesota's mineral potential.

The site provides information about doing business in MN, archives project reports and maps funded by the committee, and hosts a catalog of selected GIS data related to Minnesota's ferrous, non-ferrous, and industrial mineral resources.



## Base Map Data Sources

Jirsa M and Southwick D (2003) Mineral Potential and Geology of Minnesota. Minnesota Geological Survey, University of Minnesota. Retrieved 2010-12-08.

Jirsa MA, Boerboom TJ, Chandler VW, Mossler JH, Runkel AC, and Setterholm DR (2011) S-21 Geologic Map of Minnesota – Bedrock Geology. Minnesota Geological Survey, State Map Series S-21, Scale 1:500,000.

Ontario Geological Survey (1993) Bedrock geology, seamless coverage of the Province of Ontario; Ontario Geological Survey, Data Set 6. Scale 1:1,000,000.

Ontario Geological Survey (2010) Mineral Deposit Inventory—2010.

Peterson DM and Jirsa M (1999) Bedrock geologic map and mineral exploration data, Western Vermilion District, St. Louis and Lake Counties, Northeastern Minnesota. Minnesota Geological Survey Miscellaneous Map Series Map M-141, Scale 1:48,000.

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