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PUC webpage

<http://energyfacilities.puc.state.mn.us/Docket.html?Id=16573>

Reference PUC Docket: E6472/GS-06-688

Comments to MN PUC and US DOE

Fond du Lac Band of Lake Superior Chippewa response to the Mesaba Energy Project Draft Environmental Impact Statement

Dear Mr. Storm and Mr. Hargis

The Fond du Lac Band of Lake Superior Chippewa ("the Band"), a federally recognized tribe, is obligated to respond to the Minnesota Department of Commerce and the US Department of Energy regarding the Mesaba Energy Project DEIS. The proposed project has two alternative locations; the Taconite site is outside of ceded lands, while the Hoyt Lakes site is within the 1854 Ceded Territories to which the Band is a signatory and has usufructuary rights.

The Band has serious concerns regarding the substantial industrial 'footprint' of this project, the permitting of a significant new source of mercury, the cumulative impact to tribal trust resources, and the effect on a Class I area, in addition to several existing, expanding, and new regional projects.

The major environmental concern with this project is that it keeps energy consumers squarely on the road of increased fossil fuel consumption with real increases of CO<sub>2</sub> and their related emissions and effluents.

The Band is aware that this venture is driven by, and benefits, the vested interests with the most to lose as U.S. energy needs are met by alternatives to fossil fuels.

Our review of this project addresses both general and specific issues; this cover letter and technical attachment explain our environmental assessment.

It is understood that the Department of Energy is mandated to pursue energy projects that will secure the nation's energy needs in a cost effective and environmentally sound manner. It is also understood that the DOE Office of Fossil Energy is responsible for reviewing and partnering with Excelsior Energy for the Mesaba coal fired Integrated Gasification Combined Cycle (IGCC) power plant as part of the Clean Coal Power Initiative (CCPI).

However, it is the Band's view that the pursuit of the Mesaba Energy Project (MEP) with its inherent negative contributions to the environment, through the CCPI, cannot be legitimized by building a power plant:

- Where the electrical demand does not exist and consequently the success of the plant is dependent on forcing a power purchase agreement on a current regional electrical producer and their consumers.
- By justifying the technology as a significant advance when much of the technology cited in the draft are referenced within the draft, are not feasible at this time, are years away from commercial viability, or when implemented, said technologies are negated by increased costs and decreased efficiency (2-22, 2-23).
- Under terms which appear to force construction of the power plant regardless of any environmental inadequacies: "MDOC will not, as part of its environmental review, consider whether a different size or different type of plant should be built instead, nor can the MDOC consider the "No Build" option."
- That contributes to increased fossil fuel consumption rather than conservation, with increased unregulated, CO<sub>2</sub> emissions, as well as all other emissions and effluents associated with fossil energy.

The goal of the project as stated in Section 1.2 of the DEIS is to *"help meet the challenging environmental objectives for America embodied in the Clear Skies Initiative, Global Climate Change Initiative, FutureGen, and the Hydrogen Initiative."* The *"Clear Skies Initiative to cut nitrogen oxides (NOx), sulfur dioxide (SO<sub>2</sub>), and mercury (Hg) emissions by 70 percent over the next 15 years;."*

### **Clear Skies Initiative**

The Clear Skies Initiative has not made it out of committee at this time, however if it were to pass, according to the Sierra Club, the "Clear Skies' initiative expands the pollution trading system so some communities will get cleaner, but many communities will lose out on cleaner air. The two-stage plan isn't even fully in place for another 15 years. Even if the plan caused some net reductions in pollution, many communities would still be threatened by more pollution. "

- Mercury: The Clean Air Act would have limited "mercury pollution to 5 tons per year by 2008" while the original Clear Skies proposal would have "weakened the limit to...26 tons by 2010...this piece of the proposal was split away from the initiative and was put into place as the Clean Air Mercury Rule in 2005" which allows cap and trade with target emissions of 15 tons per year by 2018, specifically from US coal-fired power plants.
- Nitrogen Oxide (NOx): The Clean Air Act program's target levels for NOx were "1.25 million tons by 2010 while 'Clear Skies' would increase NOx "to 2.1 million tons by 2008 - an increase of 68 percent more NOx pollution."
- Sulphur Dioxide (SO<sub>2</sub>) would increase Clean Air Act program goals of 2 million tons by 2012 to 'Clear Skies' allowances "to 4.5 million tons of SO<sub>2</sub> by 2010 - a staggering 225 percent increase of SO<sub>2</sub> pollution."
- Clear Skies would also create "a loophole exempting power plants from being held accountable to the Clean Air Act's New Source Review (NSR) standards and from being required to install cleanup technology (best available retrofit technology or BART). NSR standards require new power plants and upgraded plants to comply with

modern federal emissions limits. BART protects communities from persistent haze and other air quality problems by reducing the pollution emitted from antiquated power plants.”

- ‘Clear Skies’ would delay “the enforcement of public health standards for smog and soot until the end of 2015.”
- The plan would restrict “the power of states to call for an end to pollution from upwind sources in other states. The plan prohibits any petitions of this sort from even being implemented before 2012.”

The Band cites these figures because we want to emphasize those changes in the calculation method shift the burden of reducing these wastes which results in a net increase of domestically produced emissions. These emissions would increase with the addition of the Mesaba Energy Project.

The DEIS refers to the **“Global Climate Change Initiative to cut greenhouse gas intensity 18 percent by the year 2012.”** To clarify this reference, according to the Pew Center Global Climate Change analysis, greenhouse gas intensity is the ratio of greenhouse gas (GHG) emissions to economic output expressed in gross domestic product (GDP). To quote the Pew Center, “The Administration’s target - an 18 percent reduction in emissions *intensity* between now and 2012 - will allow actual emissions to increase 12 percent over the same period. Emissions will continue to grow at nearly the same rate as at present.” Also reference GAO-04-146R Greenhouse Gas Emissions Intensity. This policy contradicts any intention of GHG reduction.

The DEIS cites to the **“Hydrogen Fuel Initiative to reverse the growing dependency on foreign oil by developing the technologies and infrastructure to produce, store, and distribute hydrogen”** Although this generating plant may reduce dependency on foreign oil, hydrogen can be isolated relatively pollution free using wind and other alternate power sources.

The DEIS also refers to the **“FutureGen Initiative to establish the technical feasibility and potential economic viability of coproducing electricity and H2 fuel from coal while capturing and sequestering carbon dioxide (CO<sub>2</sub>) and greatly reducing other air emissions.”**

The Band recommends cutting this reference from the DEIS since does not apply to this project. This project has no real relationship to FutureGen. FutureGen is based on the permanent sequestration of carbon dioxide and zero/near zero emissions. From FutureGen Alliance: “Climate change and other energy concerns have created a pressing need to move coal-to-energy technologies onto a development pathway toward near-zero emissions. FutureGen, with its goal of demonstrating successful, permanent sequestration of CO<sub>2</sub>, is a linchpin of that pathway.”

FutureGen **already** has a Final DEIS and is not dependent on the MEP to demonstrate it’s potential and in this regard, the Minnesota Statute allowing exemption is suspect: *“exempted this facility from demonstrating need and that this facility qualifies as an ‘innovative energy project,’ issues related to the need, size, or type of the facility are excluded from consideration by the MDOC-EFP staff.”*

The following references and comments from the DEIS and DOE demonstrate why this plant is not able to capture carbon, nor run on hydrogen as envisioned by the “Hydrogen Initiative”. The DEIS asserts that *“The process is also amenable to future upgrading for removal of greenhouse gases like carbon dioxide.”* Yet, in Section 2, Proposed Actions and Alternatives, Potential Carbon Capture Retrofit, the DOE says, “Carbon capture and sequestration is not feasible for the MEP.” The DEIS continues: *“Based on an analysis of the commercial*

*readiness of carbon capture and sequestration presented in Appendix A2, CCS is not considered technically or economically feasible for the MEP at this time. While both carbon capture and carbon dioxide transport are technically feasible, the technical feasibility of carbon sequestration for the MEP cannot be validated in the near-term until extensive field tests are conducted to fully characterize potential storage sites and the long-term storage of sequestered carbon has been demonstrated and verified through ongoing efforts conducted under the DOE Carbon Sequestration Program.*

*Furthermore, commercially available combustion gas turbines envisioned for this project cannot operate on carbon monoxide-depleted syngas where the hydrogen concentration approaches 100 percent. With regard to economic feasibility, imposition of CCS on the project would increase the cost of electricity such that the MEP would not be economically viable without an order from the PUC that incorporates the costs associated with CCS within the power purchase agreement.” And then an immediate contradiction, “However, the design and construction of the facility would be compatible with future implementation of any of the carbon capture and sequestration options currently being considered.” Appendix A2 also states that “Carbon capture, advanced turbines will not be available by the Mesaba in-service date. Even if turbines were available, it would result in substantial capital cost, reduce plant efficiency and increase cost of electricity by as much as 40 percent.”*

To continue, *“Without mitigation or capture/storage (Section 5.1.2.1), the plant would emit approximately 9.4 to 10.6 million tpy of CO<sub>2</sub>; thereby adding to the approximately 2.3 billion metric tpy of CO<sub>2</sub> from electric power sources nationwide.”* Again, as stated in the DEIS, only 30% of the CO<sub>2</sub> generated can be captured, a percentage that matches the DOE Energy Information Administration statement that IGCC with Carbon Capture will increase the cost of the plant by 30%. The Union of Concerned Scientists also comments in regard to CCS that *“Efficiency losses of 10-20% with currently available separation technologies result in higher fuel input per unit of delivered energy. Energy penalties of this magnitude are particularly serious if safe, long-term underground carbon storage cannot be assured”*

A comment in regard to the Plains CO<sub>2</sub> Reduction Partnership (PCOR), whose efforts hope to sequester CO<sub>2</sub> from fossil fuel *“by capturing and storing CO<sub>2</sub>, a gaseous by-product of energy generation”* points again to the continuation of and the increased use of fossil fuel by vested interests. PCOR is in its preliminary stages and although Phase III has received funding, according to the PCOR press release: *“The test will last up to 10 years and help demonstrate the safety and effectiveness of using the technology to manage greenhouse gases.”* The Mesaba plant will be half way through its engineered life cycle.

No estimates have been provided to account for energy expenditures tied to building pipelines or transporting the CO<sub>2</sub> from either site to any destination.

A complete life cycle analysis should be completed with all projects in the modern era, including the mothballing and retirement of the plant regardless of potential upgrades.

No estimates have been provided to account for the energy or the environmental costs for mining and transporting the coal to the project site.

In reviewing this project and the DOE's purpose in the program that fostered the Mesaba Energy Project; *“Technologies capable of producing any combination of heat, fuels, chemicals, or other use byproducts in conjunction with power generation were considered; however, coal is required to provide at least 75 percent of the fuel for power generation. Other technologies that cannot serve to carry out the goal of the CCPI Program (e.g., natural gas, wind power, conservation) are not relevant to DOE's decision of whether or not to provide cost-shared funding support for the MEP, and therefore, are not reasonable*

alternatives” proves this to be self-serving, self-reinforcing program that rationalizes its existence under a appealing title “Clean Coal Power Initiative.” The program is carefully worded so it does not allow admission that “Clean Coal” is not a solution to climate change and in that, fossil energy is a no-win energy strategy.

The DOE itself projects coal to be a reduced part of the over energy mix in the future, therefore, instead of digging coal out of the ground, transporting it hundreds of miles to be gasified and burned in the hopes of learning how to gasify it better, and, hopefully, so carbon can be captured and returned, *somewhere*, deep into the earth, perhaps the coal should be left there while DOE pursue environmentally feasible projects.

Again, with or without carbon capture this project keeps energy consumers squarely on the road of increased fossil fuel consumption and increased release of CO<sub>2</sub> and related emissions and effluents. The Band concludes that this venture is driven by the vested interests that do have the most to lose as U.S. energy needs are met by alternatives to fossil fuels.

Additional air and water resource technical comments are enclosed. If you have any questions regarding this letter, please contact Nancy Schuldt (878-8010), Joy Wiecks (878-8008), or Mary Munn (878-8012) of my staff.

Sincerely,

Wayne Dupuis

Fond du Lac Environmental Program Manager

MM/mm

Enclosures

c.c. Fond du Lac Reservation Business Committee Members  
Dennis Peterson, FDL Legal Counsel  
Dan Cozza, EPA Region V- Water Division  
Ben Giwojna, EPA Region V – Air and Radiation Division  
Anna Miller, EPA Region V- NEPA  
David Thornton, Assistant Commissioner, Air Policy – MPCA

## Air Quality Concerns

In a letter dated July 2006, the Minnesota Pollution Control Agency (MPCA) explained that it does not consider Excelsior's Best Available Control Technology (BACT) analysis to be complete for various reasons listed in the letter. A December 17, 2007, letter from the US Forest Service indicates that the Federal Land Manager (FLM) in this area does not agree with Excelsior's BACT proposal, either. The Band has recently learned that the MPCA and Excelsior have been unable to come to an agreement, and that EPA - Region V has been asked to review the available information and provide input or help make a determination as to what constitutes BACT for the gas turbine sulfur dioxide (SO<sub>2</sub>) and nitrogen oxide (NO<sub>x</sub>) emissions. The Band would like to add our support to the MPCA's and the FLM's arguments that Selexol constitutes BACT for SO<sub>2</sub> and that Selective Catalytic Reduction (SCR) constitutes BACT for NO<sub>x</sub>. The following paragraphs support our position.

The Band agrees with the MPCA's assertion in its October 18, 2007, letter to Excelsior that it is inappropriate to compare BACT for pulverized coal boilers to BACT for an IGCC plant, because the two technologies are different. According to the EPA's October 1990 New Source Review (NSR) Workshop Manual, this does not follow the approved procedure for determining BACT. Page B.31 of the NSR Manual states "Cost effectiveness (dollars per ton of pollutant reduced) above the levels experienced *by other sources of the same type* and pollutant, are taken as an indication that unusual and persuasive differences exist with respect to the source under review". This indicates that cost comparisons between dissimilar sources are not to be considered in the BACT analysis.

The Band does not believe the estimate control costs to remove SO<sub>2</sub> by Selexol (\$7,663/ton removed) to be excessive (see attached guidance document from Nebraska Department of Environmental Quality). In the personal experience of FDL staff members, this cost seems feasible and approvable for BACT. Therefore, the Band supports the MPCA's assertion that BACT for SO<sub>2</sub> from Mesaba is Selexol with an emission limit of 0.010 lb/mmBtu (on a heat input to gasifier basis). These costs may be further justified in light of the fact that the MPCA is working to control regional haze in the northern half of Minnesota. The MPCA has proposed a Concept Plan to address regional haze in Northern Minnesota that calls for a cap on SO<sub>2</sub> and NO<sub>x</sub> emissions in certain counties based on reductions needed to put Minnesota on the glide path to meeting regional haze requirements. Based on our review of the expected regional haze effects of this source and because SO<sub>2</sub> and NO<sub>x</sub> (the pollutants at issue in the BACT determination) are both haze-causing pollutants, some extra cost may be justified and may help prevent the need for Excelsior to take regional haze mitigation steps later on. Through the Band's experience on the Policy Oversight Group of the Central Regional Air Planning Association, a Midwest regional haze organization, a cost of \$7663/ton to remove haze-causing pollutants does not seem unreasonable.

On page B.20, the NSR Manual states, "A demonstration of technical infeasibility is based on a technical assessment considering chemical, physical and engineering principles and/or empirical data showing that the technology would not work on the emissions unit under review, or that irresolvable technical difficulties would preclude the successful deployment of the technique". The Band does not feel Excelsior has met this standard in claiming that SCR technology will not work in reducing NO<sub>x</sub> emissions. We support the MPCA's analysis that just because this technology has not been installed on

another IGCC sources does not mean that it is technically infeasible for such a source. Excelsior's claim that SCR technology should be classified "unavailable" simply because it has yet not been applied to an IGCC plant is a stretch of logic. SCR controls have been available for commercial purchase and have been used at electric generating facilities for decades.

Although the gas stream from an IGCC unit has more sulfur than the gas stream from a natural gas unit, Excelsior has not presented a case that this makes SCR technically infeasible for use at an IGCC plant. This technology has been used extensively to control SO<sub>2</sub> from coal-fired units, which also have emissions of sulfur far more concentrated than emissions from natural gas plants. This technology, while not actually put into place on other IGCC plants, has been proposed in permits for at least two plants. These facilities obviously did not have unsurmountable concerns about the use of this technology.

In a description of cooling tower emissions, the DEIS states that water from the pits will be used in the cooling tower, resulting in emissions of particulate matter from the cooling tower. What sort of analysis will be required to ensure that the particulate coming from the pit water will not contain excessive amounts of metals?

In Table 3.3-5 – Pertinent Air Quality Regulations of the DEIS (page 3.3-11), there is a curious statement applying to the Acid Rain Program, as follows: "Requirements under this program would be considered mitigation measures to reduce emissions from the IGCC power plant source". Please explain further what is meant by this statement. Acid rain reductions are a requirement under federal law, and may not be used for mitigation purposes. If Excelsior is suggesting purchasing acid rain credits and retiring them, then please make this statement clearer. It is also unclear what purpose would be served by mitigating. Improving visibility? Again, please clarify.

On page 4.3-11, the DEIS states that Excelsior didn't specifically quantify or model PM<sub>2.5</sub> emissions but instead gives a range of multiplier values that could be used. Which value was chosen for the multiplier and on what technical basis?

The Band has concerns regarding visibility at the Boundary Waters Canoe Area (BWCA) and Voyageurs National Park (VNP). Remember that the parks themselves should be the center of the analysis, not the facility. Table 5.2.2-4 shows that there could be noticeable effects (a change in visibility of exceeding 0.5 deciviews) at these locations on numerous days per year. The DEIS tries to explain these away by stating that: 1) the modeling analysis is overly conservative; and 2) that the days that potential impacts occur are days where natural visibility is poor, anyway. Our objections to these arguments are listed below.

First, the reason that maximum allowable emissions are used in visibility modeling is to provide a safety factor. In some sectors, particularly the energy sector, average actual emissions and maximum actual emissions can vary by as much as 20% over the course of a year. Allowing the use of actual emissions could underestimate reality by a large degree. It is also perfectly possible that all sources affecting visibility in the area could potentially be operating at maximum capacity at the same time. There is no practical way to ensure that this scenario won't happen, therefore conservative assumptions need to be made. Therefore, we do not believe it is true that the modeling analysis is too conservative to cause alarm.

Second, the Band believes the visibility analysis performed in Section 5.2 of the DEIS is incomplete. While tables showing analyses for increment (Table 5.2.2-2, page 5.2-4)

and Minnesota Ambient Air Quality Standards/National Ambient Air Quality Standards (Table 5.2.2-3, page 5.2-5) concentrations are included, and Table 5.2.2-4 (page 5.2-6) shows some visibility impacts data, there is no information on the expected maximum changes in the daily extinction coefficient resulting from the construction of this source for the BWCA or VNP. We believe this information is required in order for the FLM's of these Class I areas to complete their analysis. The Federal Land Managers' Air Quality Related Values Workgroup (FLAG) Phase I Report (December 2000) states in Section A.1. that a single-source contribution to a change in extinction of greater than 10% will likely lead to FLM objections to the source's air permit (a predicted change that falls into the range of 2-10% prompts FLM interest). While no data as to the expected maximum changes in the daily extinction coefficient due to the construction of this project is shown, the fact that Table 5.2.2-4 shows that this project is predicted to have potentially noticeable visibility impacts on *at least* 189 days per year leads us to believe that the daily extinction coefficient could be affected often enough to raise objections from the FLM's.

As far as stating that the number of potential impact days is related heavily to the weather, this is somewhat ridiculous, as "potential impact days" were shown to occur *at least* 189 days per year, or 52% of the time. The highest predicted number of "potential impact days" was 245 days per year, which is 67% of the time. The Band does not believe that the results shown in this table can be blamed on low temperatures, fog, or precipitation alone. From a December 17<sup>th</sup>, 2007 letter from the Forest Service to the Department of Energy, it appears that the FLM agrees.

Finally, DEIS is incomplete with regard to regional haze in that it does not take responsibility for Mesaba's potential effects on visibility in local Class I areas and it offers no ideas for mitigating these effects. In a recent air quality permitting action, Minnesota Steel accepted permit requirements for pursuing control technology and purchasing emissions credits and using green power if that control technology did not turn out to be effective enough to control its haze-causing pollutants. We suggest that Mesaba take a similar approach, along with taking another look at BACT requirements. Perhaps additional controls for SO<sub>2</sub> and NO<sub>x</sub> could resolve some of these problems.

Table 5.2.2-1 (Page 5.2-3) shows existing and future emissions from various facilities that were used in modeling for cumulative air quality impacts. This table is puzzling, as "existing" emissions for several sources appear to have been left out with no explanation. There are several blank spaces in the table for sources that are currently operating and plan to do so in the future. One example would be SO<sub>2</sub>, PM<sub>10</sub> and mercury emissions from US Steel – Minntac, both existing and future, which are shown as blanks in the table. The Band is not sure what point is being made, please explain. These emissions need to be included in the cumulative modeling. If they have not been included, then the modeling results are incomplete.

On page 5.2-2 of the DEIS, the document states that "...mining sources that emit primary particulate matter less than 10 microns (PM<sub>10</sub>) were not included in the cumulative modeling" for purposes of regional haze. The DEIS states that "Nearly all such sources are at ground level and far from Class I areas, and would not likely cause significant air quality impacts in the Class I areas". Please explain more clearly why mining sources were not included and what threshold or regulation exists to support their exclusion from this modeling. While it is true that larger particulate emissions from mining are expected to settle out on-site, PM<sub>2.5</sub> is too small to settle out in this manner.

Table 5.2.2-5 on page 5.2-7 shows that maximum total cumulative deposition rates from all sources. Results show that deposition rates for nitrogen and sulfur in the BWCA and in VNP exceed the deposition analysis threshold (DAT) of 0.01 kg/ha-year established for United States Forest Service Class I areas, specifically for the BWCA. No deposition values have been set for United States Park Service areas, such as the VNP. The DEIS does not go on to explain what this means or what changes will need to be made to ensure that the BWCA will not be adversely affected. For this reason, the DEIS is insufficient, as the deposition values in the table are several orders of magnitude greater than the DAT.

#### Mercury:

In 1991, the governments surrounding the Lake Superior Basin entered into an agreement (A Binational Program to Restore and Protect the Lake Superior Basin) to eliminate the discharge and emissions of mercury from the Lake Superior Basin by 2020, with an interim goal of an 80% reduction from 1990 levels by 2010. More recently, the state of Minnesota submitted a statewide mercury TMDL (Total Maximum Daily Load) study under the Clean Water Act §303, which was subsequently approved by the EPA. Implementing the TMDL will require a 93% reduction in mercury air emissions by 2018, for a total of 789 lbs/year of mercury air emissions from all sources. Although the TMDL process, a regulatory program under the Clean Water Act, is supposed to allocate allowable levels of contaminant loadings to impaired waters, and provide a margin of safety and room for expansion when applied to water quality permitting, this unique TMDL rests almost exclusively on draconian reductions to mercury air emissions across all sectors. It is not clear how a new source of mercury, projected at 54 lbs/year, can be permitted and still remain consistent with the TMDL. There is simply no "excess capacity" or future allowance for additional sources of mercury.

## **Water Quality and Quantity Issues**

There are substantial differences between the two alternative sites, East Range and West Range, with regard to water quality standards for the receiving waters. The East Range site is subject to the more stringent water quality standards and criteria of Minnesota Rules Chapter 7052, Lake Superior Basin (GLI or Great Lakes Initiative standards), including the general antidegradation requirements and no allowable mixing zones (for diluting the concentration of bioaccumulative contaminants of concerns, or BCC's) at the point of discharge.

The draft EIS states that "wastewater generated from the gasification and slag processing operations containing levels of heavy metals and other contaminants from the feedstocks would be treated in a ZLD (zero liquid discharge) system", which would recover distilled water for reuse and concentrate the heavy metals and other contaminants into a solid waste stream. This material would need to be disposed of at a hazardous waste facility. Process water discharged at the West Range site would be composed of cooling tower blowdown (running 3-8 cycles of concentration of constituents of the water supply sources), heat recovery steam generator (HRSG) blowdown, reject water from the boiler feed demineralizers and treated stormwater from plant drains. The DEIS does not examine or discuss treatment of this combined process water discharge, and FDL is concerned about any potential permitting for untreated wastewater into receiving waters at either of the proposed sites. This wastewater contains constituents (dissolved salts and minerals) that are orders of magnitude above ambient water quality characteristics, and are potentially harmful to aquatic organisms in the receiving waters even though they are not classified as "toxic" pollutants.

The GLI regulatory requirements (no mixing zones, more stringent criteria) become particularly important with the East Range site with respect to mercury, since the ambient concentrations in supply water sources for the East Range site are 0.75 ng/l, the applicable criterion is 1.3 ng/l, and the operational design for recycling the blowdown water would be severely restricted. The draft EIS states that Excelsior's preferred approach for overcoming these operational constraints would be to expand the ZLD technologies to treat all process water streams, significantly increasing costs. If Excelsior can consider utilizing the ZLD technologies at the East Range site to treat process wastewater contaminants, then they should be required to consider ZLD or other treatment options (for example, reverse osmosis) for their West Range wastewater discharges. The Band would adamantly oppose any NPDES permit application for untreated industrial wastewater discharges.

As proposed, the wastewater discharges from the facility are expected to exceed the applicable water quality standards for total hardness, total dissolved solids, sulfate, and conductivity in the Canisteo Mine Pit and Holman Lake. The DEIS states that "Excelsior would have to apply for a waiver to exceed standards for these parameters and be granted a waiver by the MPCA during the permitting process in order to operate the generating station." The Band would strongly oppose any NPDES permit application that included a request for a variance, as the Clean Water Act and state water quality regulations require that the applicable water quality standards must be met. Variances are only warranted on a temporary basis, with the explicit permitting condition of needing to develop a specific plan and timeline to meet the water quality standards. The DEIS seems to consider the "waiver" to be a permanent solution to their problem of noncompliance.

The discussion of stormwater management for this proposed project is extremely deficient in detail required for a thorough analysis of environmental impacts. Although the critical elements required to develop a stormwater pollution prevention plan (SWPPP) are defined in Section 4.5.2.5, a well-drafted DEIS should actually include the SWPPP for the Preferred Alternative in the appendix section.

Water supply issues are critical for an industrial project of this scale. While the DEIS makes a case for the 'synergy' of using mine pit water at its East Range site, providing other mining operations some relief for their dewatering permit conditions, it also notes that Colby Lake is a potential supplemental source of process water. SDI (Mesabi Nugget) is already permitted for a significant water withdrawal from Colby Lake, which also serves as the public drinking water supply for the city of Hoyt Lakes.

### **Cumulative Impacts**

A significant number of industrial (mining) projects exist, are under development, or are proposed in the region. While the Band does not seek to inhibit regional economic development, we are committed to protecting the environment, natural, and cultural resources. Our exercise of treaty-guaranteed usufructuary rights relies upon the existence and persistence of these resources. The cumulative impact from all industrial projects on the Range – essentially within the 1854 Ceded Territories - is a vital issue that has not been adequately addressed in this DEIS or any of the others that have been released in recent years. Attached is a protocol developed by the U.S. EPA, with input from tribes in Region 5, which lays out a more appropriate approach for a true, comprehensive cumulative impacts analyses from a Native American perspective. The Band urges the agencies to refer to this protocol in their determination of the adequacy of this part of the EIS review. Results from the human health risk analysis of the East Range Site indicated that the hazard/cancer risk would exceed Minnesota Department of Health standards in an overlapping area with other mining projects. This is of concern, and cumulative impacts to the resources (air, water, wetlands, wildlife, etc.) must be clearly understood and identified.

Since the DEIS noted in multiple instances that the West Range site was preferred, the analyses generally focused on this site and related impacts. For many issues, the DEIS didn't include nearly as much detailed information on the alternative East Range Site. Environmental impacts are among reasons for preferring the West Range including water supply, greater distance from Class I air areas, and location outside of Lake Superior Basin with its more restrictive water quality permitting requirements. Cumulative impacts from multiple existing and planned mining operations near the East Range Site are potentially high, impacting the St. Louis River, Partridge River, and Embarrass River watersheds. We are concerned that the East Range site may become the preferred location, because of the scenario described in Section 4.5.4 whereby the perceived benefits or 'synergy' of this project's use of other mines' process wastewaters would influence the site selection: "This feature could integrate well with the proposed industrial mining activities to be located on (Cliffs Erie) properties by eliminating wastewaters that would otherwise represent new discharges to impaired waters downstream. Further, the MPCA must cope with the existing rules to license and permit such projects, recognizing the socioeconomic benefits they would bring". In that case, we would request a supplemental EIS and an opportunity to further evaluate impacts to the environment.

**FINAL PROTOCOL TO ASSESS EXPANDED CUMULATIVE IMPACTS ON  
NATIVE AMERICANS**

**Submitted by:**

**Booz Allen Hamilton**

**Submitted to:**

**EPA Region 5**

**May 31, 2007**

**REPA3-5803-151v3**

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**LIST OF ACRONYMS**

|        |   |
|--------|---|
| AOC    | Area of concern                                 |
| AOI    | Area of influence                               |
| AQD    | Air Quality Division                            |
| ARD    | Air and Radiation Division                      |
| BA     | Biological Assessment                           |
| BACT   | Best available control technology               |
| BLM    | Bureau of Land Management                       |
| BMP    | Best management practices                       |
| BO     | Biological Opinion                              |
| CAA    | Clean Air Act                                   |
| CDOT   | Colorado Department of Transportation           |
| CEQ    | Council on Environmental Quality                |
| CEQA   | California Environmental Quality Act            |
| DEM    | Digital elevation model                         |
| DOQQ   | Digital orthoimagery quarter quadrangle         |
| DRG    | Digital raster graphics                         |
| EA     | Environmental assessment                        |
| EAW    | Environmental assessment worksheet              |
| EDA    | Environmental Data Access                       |
| EIS    | Environmental impact statement                  |
| EPA    | Environmental Protection Agency                 |
| ExROI  | Expanded region of influence                    |
| FEMA   | Federal Emergency Management Agency             |
| FHWA   | Federal Highway Administration                  |
| GAP    | Gap Analysis Program                            |
| GIS    | Geographic information system                   |
| GLIFWC | Great Lakes Indian Fish and Wildlife Commission |
| HAP    | Hazardous air pollutant                         |
| HCP    | Habitat conservation plan                       |
| IEO    | Indian Environmental Office                     |
| ISTS   | Individual sewage treatment system              |
| MAERS  | Michigan Air Emissions Reporting System         |
| MI     | Michigan  |
| MiDEQ  | Michigan Department of Environmental Quality    |
| MiDNR  | Michigan Department of Natural Resources        |
| MN     | Minnesota                                       |
| MnDNR  | Minnesota Department of Natural Resources       |
| MnPCA  | Minnesota Pollution Control Agency              |
| NEPA   | National Environmental Policy Act               |
| NMFS   | National Marine Fisheries Service               |
| NOAA   | National Oceanic and Atmospheric Administration |
| NPDES  | National Pollutant Discharge Elimination System |
| NRHP   | National Register of Historic Places            |
| NRIS   | National Register Information System            |

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|         |  |
|---------|--|
| NWI     | National Wetlands Imagery                |
| NWRC    | National Wetlands Research Center        |
| PDF     | Portable document format                 |
| PFC     | Perfluorochemicals                       |
| ROD     | Record of Decision                       |
| ROI     | Region of influence                      |
| SHPO    | State Historic Preservation Officer      |
| SSURGO  | Soil survey geographic                   |
| STATSGO | State soil geographic                    |
| T&E     | Threatened and endangered                |
| TESS    | Threatened and endangered species system |
| THPO    | Tribal Historic Preservation Officer     |
| TMDL    | Total maximum daily load                 |
| UIC     | Underground injection control            |
| USDA    | United States Department of Agriculture  |
| USFWS   | United States Fish and Wildlife Service  |
| USGS    | United States Geological Survey          |
| VMAP    | Vector map                               |
| WDS     | Waste data system                        |

## **PROTOCOL TO ASSESS EXPANDED CUMULATIVE IMPACTS ON NATIVE AMERICANS**

### **Background**

Several Native American Tribes want to better prepare for development of metal mines that is ongoing and planned in the Mesabi Range and Duluth Complex of northeastern Minnesota and the western Upper Peninsula of Michigan. The proposed mining projects are located near one or more Tribal Reservations and/or within ceded territories where one or more Tribes have fishing, hunting, and gathering rights by treaty. Wilderness, national forests, state forests, and state parks are also located nearby. Because Tribal lands, public lands, and mining sites are widespread, dispersed, and interspersed—and because of unique Tribal cultural concerns associated with resources in the area (e.g., fish and wildlife, wild rice, and traditional cultural properties)—there is need for an expanded approach to cumulative impact assessment. Unique Tribal concerns may include ensuring preservation of the following, among other concerns:

- Water with naturally high quality without
  - Changes in concentrations of unregulated substances
  - Synergistic effects of multiple individually unregulated or loosely regulated substances
  - Impacts to water that make it unsuitable for cultural uses
- Lakes, rivers, wetlands, and other water bodies where wild rice grows
- Water and soil quality that enable wild rice to grow
- Water quality necessary to support fish populations
- Plants and wildlife (e.g., moose, grouse, deer) of significance to the Tribes
- Sufficient wildlife populations and habitat to support traditional hunting, fishing, and gathering
- Fish and wildlife without contaminants that preclude their frequent consumption
- Archeological locations or areas
- Traditional or historic properties, locations or areas (e.g., traditional locations for hunting, fishing, and gathering; springs and ceremonial sites; other places where historic events occurred)
- Sacred locations or areas (e.g., gravesites, spiritual sites) without visual or noise impacts that would make them unsuitable for traditional activities
- Habitats that host culturally important resources (e.g., pipestone, sage, other culturally important plants)
- Access to areas where Tribes have hunting, fishing, or gathering rights and to lands where off-reservation treaty harvest occurs

- Cultural items as defined by the Native American Graves Protection and Repatriation Act, 25 USC 3001, including funerary objects, sacred objects, and cultural patrimony
- Social bonds associated with traditional activities
- Tribal jurisdiction and control over reservation lands, thus improving or maintaining quality of life for residents of the reservations.

This is not an exhaustive list of all concerns related to mining and its cumulative impacts to Tribal resources, but is indicative of the types of concerns that may be identified by the different Tribes in one or more reservations or ceded territories. It should be kept in mind that each Tribe may have different priorities or concerns.

As a result of these concerns, Booz Allen was tasked with developing a Protocol to Assess Expanded Cumulative Impacts on Native Americans (Protocol), a Checklist for Data Collection to Assess Expanded Cumulative Impacts (Checklist), and an Information Source List (Source List). The Protocol is provided below. The Checklist and Source List are provided in Appendix I and Appendix II, respectively.

### **Goal**

The goal of this Protocol is to present the guidance for cumulative impact assessment, discuss the general approach to cumulative impact assessment under the National Environmental Policy Act ([NEPA](#)), and then address unique Tribal considerations in conducting a cumulative impact assessment that is sensitive to Tribal rights and concerns. This expanded assessment would consider cumulative impacts across a broader area and focus on the collective impacts of all projects in the area relative to Tribal traditions, values, and concerns. Such an expanded cumulative impact assessment is based on the precepts of NEPA but is not legally required by NEPA.

This document may assist Federal and state agencies to better understand Tribal concerns and how to incorporate them into cumulative impact assessments. It may also help Tribal governments participate in project scoping processes and to better prepare for the gathering and assessing of information related to cumulative impact assessments.

Finally, this document may serve as a template for assessing cumulative impacts to other widespread interests or resources such as tourism, hunting, and bird watching, or national wildlife refuges, migration corridors, special use areas for wide-ranging species (e.g., elk, wolves, whooping cranes, bald eagles), and regional air quality. For such other widespread interests or resources, the Tribal interests that are the focus of this Protocol may be considered as an example used for purposes of discussion. Similarly, the Mesabi Range that is the focus of this Protocol may be considered an example of the types of expanded areas that might be considered for other widespread interests or resources.

Implementation of this Protocol can be done by the Tribes, Federal agencies, treaty organizations, or other groups, singly or collectively, depending on their shared responsibilities and concerns.

Finally, irrespective of who uses the Protocol and Checklist, planning at the ExROI scale would be beneficial because it would enable the following:

- Early collection of needed data so that projects are not delayed because necessary field studies were not identified until the NEPA process is underway.
- Money to be spent filling data gaps rather than repeatedly conducting the same types of surveys in similar locations.
- Maintenance of an established minimum supply of critical resources (e.g., areas where wild rice grows, bald eagle nest trees, moose calving areas) at all times, by restricting disturbance in such areas until previously disturbed areas have been successfully reclaimed.

### **Requirements for Cumulative Effects Assessment**

The assessment of cumulative effects or impacts<sup>1</sup> is required under [NEPA](#) as directed by the [Council on Environmental Quality \(CEQ\) Regulations for Implementing NEPA](#). Section 102 of NEPA recognizes the long-range character of environmental problems and requires consideration of local, short-term uses, as well as maintenance and enhancement of long-term productivity. Section 1502.16 of the CEQ Regulations for Implementing NEPA requires that the discussion of environmental consequences of a project include discussion of:

- Direct effects and their significance (Sec. 1508.8).
- Indirect effects and their significance (Sec. 1508.8).
- Possible conflicts between the proposed action and the objectives of Federal, State, [regional, Tribal], and local plans, [policies, controls], and laws for the area concerned. (See Sec. 1506.2(d).)
- The environmental effects of alternatives including the proposed action. The comparisons under Sec. 1502.14 will be based on this discussion.
- Energy requirements and conservation potential of various alternatives and mitigation measures.
- Natural or depletable resource requirements and conservation potential of various alternatives and mitigation measures.
- Urban quality, historic and cultural resources, and the design of the built environment, including the reuse and conservation potential of various alternatives and mitigation measures.
- Means to mitigate adverse environmental impacts (if not fully covered under Sec. 1502.14(f)).

Section 1508.7 states: “‘Cumulative impact’ is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.”

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<sup>1</sup> Section 1508.8 states: "Effects includes [*sic*] ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Effects may also include those resulting from actions which may have both beneficial and detrimental effects, even if on balance the agency believes that the effect will be beneficial."

Since 1978, when this guidance was first published<sup>2</sup>, there has been considerable discussion regarding [how cumulative impacts should be addressed](#) and [how "other past, present, and reasonably foreseeable future actions" should be defined](#). Particularly relevant to consideration of cumulative impacts from metal mining in the northern Midwest are questions regarding: (1) over what geographic area should information be collected and evaluated, (2) what information is needed, and (3) over what time frame should information be evaluated. The answers to these questions depend in part on the following: existing CEQ and other guidance; the resource being evaluated; the unique considerations required by the widespread, dispersed, and interspersed nature of Tribal lands, public lands, and mining sites; and the unique Tribal cultural concerns. The approach taken in responding to these questions below is to identify key references from CEQ and other guidance, address general considerations, and then focus on unique Tribal considerations.

### **OVER WHAT GEOGRAPHIC AREA SHOULD INFORMATION BE COLLECTED AND EVALUATED?**

**CEQ and Other Guidance:** The best guidance on defining the geographic area can be found in a 1993 CEQ report ([Incorporating Biodiversity Considerations into Environmental Impact Analysis Under the National Environmental Policy Act](#)), a 1997 CEQ document ([Considering Cumulative Effects Under the National Environmental Policy Act](#)), and a 1999 EPA document ([Consideration of Cumulative Impacts in EPA Review of NEPA Documents](#)).

**General Approach:** According to the 1999 EPA document ([Consideration of Cumulative Impacts in EPA Review of NEPA Documents](#)), there is no "cookbook" approach to cumulative analysis or to defining the geographic area within which

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<sup>2</sup> The most [current version of this guidance](#) is from 1987.

information should be collected and evaluated. The 1993 CEQ report ([Incorporating Biodiversity Considerations into Environmental Impact Analysis Under the National Environmental Policy Act](#)) states:

Scale is a central issue in the ecosystem approach. The appropriate boundary is one that ensures adequate consideration of all resources that are potentially subject to non-trivial impacts. For some resources, that boundary can be very large. The long-range atmospheric transport of nutrients and contaminants into water bodies such as the Great Lakes and Chesapeake Bay transcends even the boundaries of their vast watersheds. At the other end of the spectrum, significant contributions to biodiversity protection can be made by identifying and avoiding small sensitive areas, such as rare plant communities. Determining relevant boundaries for assessment is guided by informed judgment, based on the resources potentially affected by an action and its predicted impacts.

This same logic is relevant to the consideration of cumulative impacts.

The 1997 CEQ document ([Considering Cumulative Effects Under the National Environmental Policy Act](#)) states:

Analyzing cumulative effects differs from the traditional approach to environmental impact assessment because it requires the analyst to expand the geographic boundaries and extend the time frame to encompass additional effects on the resources, ecosystems, and human communities of concern....These expanded boundaries can be thought of as differences in hierarchy or scale....[C]umulative effects analysis should be conducted on the scale of human communities, landscapes, watersheds, or airsheds. Choosing the appropriate scale to use is critical and will depend on the resource or system....

A useful concept in determining appropriate geographic boundaries for a cumulative effects analysis is the...[area of interest (AOI)]. For a proposed action or reasonable alternative...

Determine the area that will be affected by that action. That area is the...[AOI].

Make a list of the resources within th[e AOI]...that could be affected by the proposed action.

Determine the geographic areas occupied by those resources outside of the...[AOI]. In most cases, the largest of these areas will be the appropriate area for the analysis of cumulative effects [or region of influence (ROI), as illustrated in Attachment 1].

Determine the affected institutional jurisdictions, both for the proposing agency and other agencies or groups.

[AOIs]...for a proposed action are likely to vary for different resources and environmental media....[T]he boundaries for an individual resource should be related to the resource's dependence on different environmental media. Table [1] provides some possible geographic boundaries for different resources. This list is *not* inclusive. The applicable geographic scope needs to be defined case by case.

One way to evaluate geographic boundaries is to consider the distance an effect can travel....Which boundary is the most appropriate depends both on the accumulation characteristics

of the effects being assessed and an evaluation of the management or regulatory interests of the agencies involved.

**Table 1. Geographic Areas that Could be Used in a Cumulative Effects Analysis\***

| <b>Resource</b>         | <b>Possible Geographic Areas for Analysis</b>   |
|-------------------------|---|
| Air quality             | Metropolitan area, airshed, or global atmosphere  |
| Water quality           | Stream, watershed, river basin, estuary, aquifer, or parts thereof  |
| Vegetative resources    | Watershed, forest, range, or ecosystem  |
| Resident wildlife       | Species habitat or ecosystem  |
| Migratory wildlife      | Breeding grounds, migration route, wintering areas [(critical for species survival)], or total range of affected population units |
| Fishery resources       | Stream, river basin, estuary, or parts thereof; spawning area and migration route   |
| Historic resources      | Neighborhood, rural community, city, state, Tribal territory, known or possible historic district                                 |
| Sociocultural resources | Neighborhood, community, distribution of low-income or minority population, or culturally valued landscape [or area]              |
| Land use                | Community, metropolitan area, county, state, or region [and ceded treaty areas for specified uses]                                |
| Coastal zone            | Coastal region or watershed   |
| Recreation              | River, lake, geographic area, or land management unit   |
| Socioeconomics          | Community, metropolitan area, county, state, or country   |

\*From 1997 CEQ document except for bracketed additions

Finally, EPA's 1999 document ([Consideration of Cumulative Impacts in EPA Review of NEPA Documents](#)) notes:

Geographic boundaries and time periods used in cumulative impact analysis should be based on all resources of concern and all of the actions that may contribute, along with the project effects, to cumulative impacts. Generally, the scope of analysis will be broader than the scope of analysis used in assessing direct or indirect effects. To avoid extending data and analytical requirements beyond those relevant to decision making, a practical delineation of the spatial...scales is needed. The selection of geographic boundaries...should be, whenever possible, based on the natural boundaries of resources of concern...EPA reviewers should determine whether the NEPA analysis has used geographic...boundaries large enough to include all potentially significant effects on the resources of concern. The NEPA document should delineate appropriate geographic areas including natural ecological boundaries, whenever possible....

Spatial...boundaries should not be overly restricted in cumulative impact analysis. Agencies tend to limit the scope of their analyses to those areas over which they have direct authority or to the boundary of the relevant management area or project area. This is often inadequate because it may not cover the extent of the effects to the area or resources of concern....

The EPA reviewer can determine an appropriate spatial scope of the cumulative impact analysis

by considering how the resources are being affected. This determination involves two basic steps:

[I]dentifying a geographic area that includes resources potentially affected by the proposed project and

[E]xtending that area, when necessary, to include the same and other resources affected by the combined impacts of the project and other actions.

In practice, the areas for several target species or components of the ecosystem can often be captured by a single ecoregion or watershed....Boundaries would be based on the

resources of concern and the characteristics of the specific area to be assessed....For practical purposes, ecological boundaries may need to be combined with political boundaries to adequately delineate the assessment area....

EPA reviewers should recommend that the proper spatial scope of the analysis include geographic areas that sustain the resources of concern. Importantly, the geographical boundaries should not be extended to the point that the analysis becomes unwieldy and useless for decision-making. In many cases, the analysis should use an ecological region boundary that focuses on the natural units that constitute the resources of concern....For non-ecological resources, other geographic areas, such as historic districts (for cultural resources) or metropolitan areas (for economics), should be used.

The information above conveys the following key thoughts:

- The boundary should ensure adequate consideration of all resources potentially subject to non-trivial impacts.
- AOIs are likely to vary for different resources and environmental media and should be based on natural boundaries of the resources when possible.
- Boundaries for a resource should relate to its dependence on different environmental media, the accumulation characteristics of the effects being assessed, and the management or regulatory interests of the agencies involved.
- Data and analytical requirements should not be extended beyond those relevant to decision making.

Attachment 2 illustrates how this guidance can be applied to specific resources, for the two different types of geographic areas, the AOI and ROI. The second and third columns, respectively, address defining the resource-specific AOI used for project-specific impacts and the ROI used for cumulative impacts related to a proposed project.

**Unique Tribal Considerations:** For consideration of cumulative impacts on collective Tribal lands<sup>3</sup>, a third type of geographic area is needed—an expanded ROI (ExROI), as illustrated in Attachment 1. The ExROI shown in Attachment 1 is based on the Ceded

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<sup>3</sup> Note here and below that this Protocol could also be applied to lands associated with cumulative impacts to other widespread interests or resources.

Territory in Minnesota and provides an example of how such an area might be defined. The definition of the ExROI for each resource category is presented in Attachment 2. As apparent in Attachment 2, the ExROI should be defined as a single polygon that encompasses all Tribal lands (including reservation and Treaty lands). However, the boundaries of the polygon may vary by resource and include areas beyond ceded territory where impacts may also include impacted resources within ceded territory and within reservation boundaries.

Key differences between the ROI and ExROI in terms of boundary definition are that the ExROI is:

- Based on a single area that incorporates all reservation lands, Treaty lands, and intervening lands that collectively affect resources, properties, and uses associated with Tribal traditions, activities, and perspectives. In some cases, considerations for individual resources make this area even larger, as discussed in Attachment 2.
- Not defined on the basis of a proposed project, but encompasses all projects that may impact the collective area of Tribal interest.
- Not constrained by the need to consider only resources impacted by a proposed project, but is defined for all resources impacted by any development.
- Not constrained by the management or regulatory interests of any agency.
- Not constrained by a need to be relevant to decision making for any specific project, although it may inform the decision-making process for each of the projects it contains.

The ultimate goal is to fully characterize the ExROI for all parameters. Data that are available typically come from established monitoring networks such as U.S. Geological Survey (USGS) water quality data, or from project-specific data collection efforts for evaluation of impacts in project-specific AOIs or evaluation of cumulative impacts in project ROIs. However, not all data are available throughout the ExROI and, even if they were, the task of collecting them could be prohibitively expensive and time consuming.

Therefore, a fourth geographic area is defined in this Protocol to help focus the collection of existing data and identify any need for new field data. This fourth geographic area, the area of concern (AOC), is defined as selected Tribal lands of particular importance (such as a wetland where wild rice is harvested or a stream where fish are caught) plus the area of one or more (past, present, or future) projects, and those lands in between that might be impacted. Thus, an AOC is focused initially on Tribal lands of importance and what impacts them, rather than on a particular project and what it, together with other nearby projects, impacts. AOCs collectively will begin to characterize the entire ExROI—the ultimate goal of this expanded cumulative impact analysis. It should be noted that an AOC may be defined on the basis of a particular type of resource (e.g., geologic resources or fish and wildlife resources) or on the basis of an aggregate of resources (e.g., because it contains geologic and fish and wildlife resources that together are important cultural resources).

### **WHAT INFORMATION IS NEEDED?**

**CEQ and Other Guidance:** The best guidance regarding the information needed in evaluating cumulative effects can be found in three documents: [Considering Cumulative Effects Under the National Environmental Policy Act](#), [Consideration of Cumulative Impacts in EPA Review of NEPA Documents](#), and [Modernizing NEPA Implementation](#).

**General Approach:** Within the first two geographic areas, the AOI and ROI, information must be collected to characterize those aspects of the existing environment that may be impacted relative to a proposed project. Within the AOI, only impacts associated with implementation of the proposed project need to be considered. Within

the ROI, cumulative impacts associated with the proposed project are considered together with the same type of impacts resulting from other past, present and future projects.

When evaluating cumulative impacts, the full range of environmental resources should be considered, although all resources may not need to be evaluated for a given project.

Addressing these resources in the general sequence by which they provide ecosystem components is efficient, logical, and helpful in understanding their role in the ecosystem.

The resources that should be addressed and their recommended sequence are provided in Attachment 2.

If no time and cost constraints were present, the information used to characterize the AOI and ROI would be the same and detailed data would be evaluated to determine impacts within each. The only constraint would be that the resource data considered for other projects in the ROI would need to be relevant to resource impacts that would result from the proposed project. The second and third columns of Attachment 2 illustrate the type of information desired for the AOI and ROI by resource.

However, because time and cost constraints are present, the evaluation of impacts within a larger geographic area must be more focused on those ecosystem components, functions, and locations that are most critical or serve as indicators for other, typically less sensitive, components and functions. For example:

- Data on water quality parameters such as dissolved oxygen, pH, or dissolved metals, might be needed from multiple locations that are immediately up drainage or down drainage from a project development site to characterize project-specific impacts. These sampling locations would be used to define the water quality AOI. These same parameters might be quantified to characterize the ROI, but here, the data would be collected (or modeled) at carefully selected outflows of watersheds containing multiple projects expected to have impacts that could combine with the anticipated impacts of the proposed project. These data would characterize the cumulative impacts. If data from these outflow locations indicate impacts or likely impacts, then upstream data locations could be considered so that the source of the contaminants could be isolated.

- Data on all fish and wildlife species, populations, and use of habitat in the project area would best characterize the AOI. However, even in this smallest geographic area, because of the large number of species, data collection is typically focused on game species, other species of particular public interest, top food chain species, and keystone prey species, as well as on threatened/endangered or other sensitive species. Data collected within the ROI to evaluate cumulative impacts associated with a proposed project would be similarly focused. However, rather than considering impacts on individuals of the selected species, it would address impacts on populations from the proposed and other projects within the ROI (except for threatened/endangered species, where impacts on individual organisms would continue to be the focus).

**Unique Tribal Considerations:** Within the ExROI, cumulative impacts associated with all projects should be evaluated relative to specific Tribal concerns, activities, and perspectives, as detailed in the fourth column in Attachment 2. With no constraint to focus only on resources that are impacted by a specific proposed project, it is appropriate to evaluate the cumulative impacts of all projects on all resources to ensure that species and other resources that are of particular Tribal interest will be evaluated.

However, these types of information cannot be collected to fully characterize every resource across the entire area because the time and cost constraints apply here, just as they do in the assessment of cumulative impacts in the ROI. These constraints are even more restrictive in the ExROI because of its size and because the full range of resources should be considered, but not necessarily addressed. Therefore, the following plan to collect a subset of particularly relevant data is suggested:

- Develop an initial list of all aspects of the environment that are necessary for traditional Tribal activities and to support Tribal culture. Start with the list in the Background section above and refine it. While some of this information may be sensitive and Tribes may not want to release it, it may also be difficult to protect resources unless their importance has been identified, so a fine balance must be maintained. To resolve this problem, it may be possible to identify representative or surrogate environmental components whose protection will also protect those components that are most culturally sensitive.
- Next, determine what information is needed to characterize the quality of the environment relative to Tribal activities and culture. Suggested types of information are listed in Attachment 3. Most of this information would be particularly useful if aggregated in a geographic information system (GIS).
- Review the Checklist (Appendix I) for further information on the specific resource data that should be considered.

- Evaluate development of a shared GIS to help organize, visualize, and evaluate data that are available and needed, and to define the specific boundaries of AOCs. The GIS may be shared among the Tribes or among other groups or agencies with a common collective interest. The benefits of a GIS are discussed more fully in the Checklist.
- Prioritize the AOCs, and the types of data that will be most useful in determining the quality of their resources. Information in the Checklist should help in selecting the data needed.
- Review the Checklist for key sources of available data, and the Assessment of Existing Data <sup>4</sup> to help determine which sources are most useful.
- Collect the most important data for the most important locations first. This might be data on sulfates in drainages upstream from key wetlands where wild rice is harvested, or mercury concentrations in watersheds where fish are harvested for consumption.
- Design the database so that it is easy to keep current and is useful. Build in ways that data can be visualized so that trends are easy to spot (e.g., trends in mercury concentrations are much more apparent in a graph than in a table). A GIS has major advantages here.
- Continue to update and expand the database as time and money allow.

### **OVER WHAT TIME FRAME SHOULD INFORMATION BE EVALUATED?**

**CEQ and Other Guidance:** Guidance regarding time frame is found in the 1997 CEQ document ([Considering Cumulative Effects Under the National Environmental Policy Act](#)), and the 1999 EPA document ([Consideration of Cumulative Impacts in EPA Review of NEPA Documents](#)). An additional source of guidance is a 2005 CEQ memorandum entitled [Guidance On The Consideration Of Past Actions In Cumulative Effects Analysis](#).

**General Approach:** Initial guidance on the time frame to consider when assessing cumulative impacts was somewhat generalized. For example, the following information was taken from the guidance cited above.

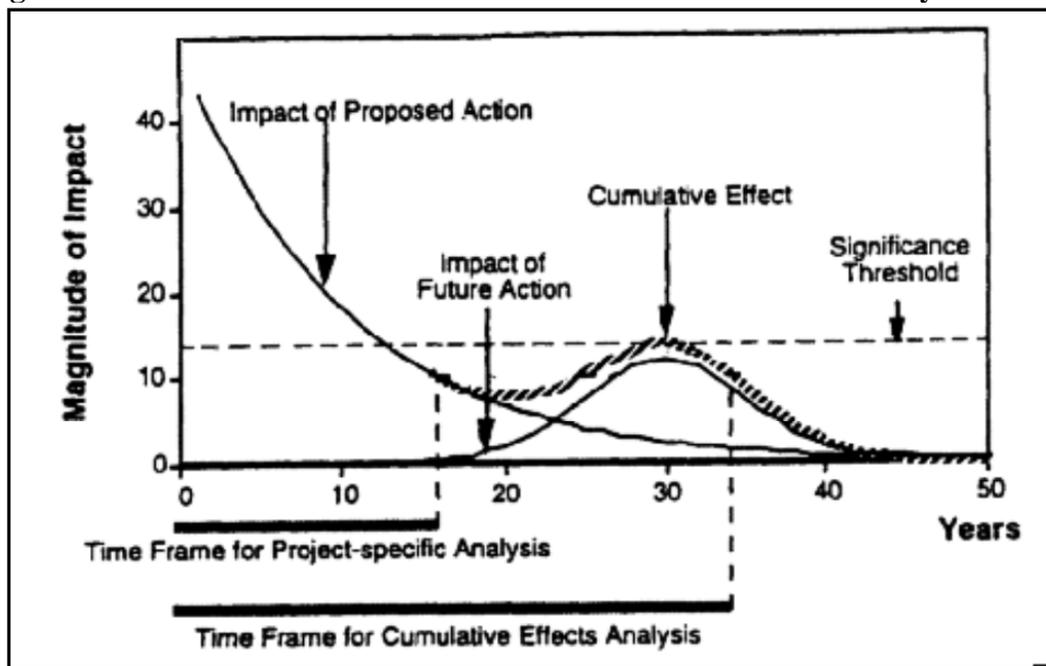
The 1997 CEQ document states the following:

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<sup>4</sup> A draft of the Assessment of Existing Data is not yet available.

- The time frame of the project-specific analysis should also be evaluated to determine its applicability to the cumulative effects analysis. This aspect of the cumulative effects analysis may at first seem the most troublesome to define. CEQ's regulations define cumulative effects as the "incremental effect of the action when added to other past, present and reasonably foreseeable future actions" (40 CFR 1508.7). In determining how far into the future to analyze cumulative effects, the analyst should first consider the time frame of the project-specific analysis. If the effects of the proposed action are projected to last five years, this time frame may be the most appropriate for the cumulative effects analysis. The analyst should attempt to identify actions that could reasonably be expected to occur within that period.
- There may be instances when the time frame of the project-specific analysis will need to be expanded to encompass cumulative effects occurring further into the future (Figure [1]...). For instance, even though the effects of a proposed action may linger or decrease slowly through time, the time frame for the project-specific analysis usually does not extend beyond the time when project-specific effects drop below a level determined to be significant. These project-specific effects, however, may combine with the effects of other actions beyond the time frame of the proposed action and result in significant cumulative effects that must be considered....
- The availability of data often determines how far back past effects are examined. Although certain types of data (e.g., forest cover) may be available for extensive periods in the past (i.e., several decades), other data (e.g., water quality data) may be available only for much shorter periods. Because the data describing past conditions are usually scarce, the analysis of past effects is often qualitative.

**Figure 1. Consideration of Time Frame for Cumulative Effects Analysis**



Guidance in the 1999 EPA document suggests that the temporal scale must be delineated practically, and be based on a period of time for which the proposed action's impacts will persist (even if this extends beyond the project life). This guidance goes on to state:

- Determining the temporal scope requires estimating the length of time the effects of the proposed action will last. More specifically, this length of time extends as long as the effects may singly, or in combination with other anticipated effects, be significant on the resources of concern. At the point where the contribution of effects of the action, or combination of all actions, to the

cumulative impact is not significant the analysis should stop. Because the important factor in determining cumulative impact is the condition of the resource (i.e., to what extent it is degraded), analysis should extend until the resource has recovered from the impact of the proposed action.

- For example, an impact assessment of ground water withdrawals to cool power plant turbines should go beyond determining whether the capacity of the aquifer is adequate to provide water for the life of the power plant. The analysis should also consider the long-term effects of lowering the aquifer level. Should municipal drinking water and agricultural irrigation withdrawals increase in the future, the cumulative effect of the power plant withdrawals may lower aquifer levels to the point where, at predictable intervals in the future, droughts will eliminate all supply. The NEPA document may, therefore, have to consider time periods beyond the life of the power plant.

To further clarify this guidance, which is particularly general with regard to consideration of past actions, CEQ issued a memorandum in 2005 ([Guidance On The Consideration Of Past Actions In Cumulative Effects Analysis](#)). The salient points in this memorandum are the following:

Regulations on cumulative effects...requir[e]...analysis and a concise description of the identifiable present effects of past actions to the extent that they are relevant and useful in analyzing whether the reasonably foreseeable effects of the agency proposal for action and its alternatives may have a continuing, additive and significant relationship to those effects.....

[U]se scoping to focus on the extent to which information is "relevant....essential to a reasoned choice among alternatives...and can be obtained without exorbitant cost. 40 CFR 1502.22....

[A]gencies have discretion to determine whether, and to what extent, information about the specific nature, design, or present effects of a past action is useful...and...are not required to list or analyze the effects of individual past actions unless such information is necessary to describe the cumulative effect of all past actions combined.

Agencies retain substantial discretion as to the extent of such inquiry and the appropriate level of explanation...[and] [g]enerally...can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions.

An additional point made in this guidance is that information from "...direct and indirect effects of individual past actions may also be useful in illuminating or predicting the direct and indirect effects of a proposed action...", even when such effects may not be cumulative with the effects of the proposed action.

**Unique Tribal Considerations:** The above guidance is relevant to the time frame that should be considered in an expanded cumulative analysis. The consideration of cumulative impacts across the ExROI should include past, present, and future actions that may impact Tribal traditions, values, and concerns.

Because traditional Tribal land uses and perspectives tend to relate to the natural (pre-development) state of the land, all actions (past, present, and future) that result in changes in that natural state should be considered equally. Further, past and present actions should each be considered when developing a baseline against which the significance of expanded cumulative impacts from future actions can be measured. Thus, impacts to a resource should be compared to two baselines: the pre-development condition of the resource (to the degree that this is known) and the present condition of the resource. For example, suppose that 2,000 acres of wild rice wetlands once occurred in the ExROI, 200 acres currently remain, and a proposed project would remove 100 such acres. It would be important to document that the 100 acres remaining comprise 5 percent of the original wetlands, as well as that 50 percent of the remaining wetlands would be lost. Using both comparisons provides important perspective on the status of a resource subject to traditional uses and the significance of the resource.

However, as pointed out above, past actions may need to be considered qualitatively because quantitative data may be lacking. Written excerpts from old journals and Tribal oral traditions that are sufficiently specific to illustrate the natural resource abundance in a particular area can support qualitative descriptions for some resources.

As data become more recent, they should become more quantitative for most resources. Data on many relatively recent projects and other developments should be available from

general monitoring programs and from project-specific analyses and data collected for compliance with Federal and State laws. These data should be available from regulatory agencies and in documents prepared to assess project-specific impacts. The Assessment of Existing Data will address the usefulness of such data in characterizing impacts across the ExROI. Because such data are abundant, but disparate, and the ExROI is large, use of a GIS system to understand the distribution of data in time and space is crucial. GIS layers that illustrate where data for selected parameters are available could be developed for time blocks that become larger toward the past when data were more scarce. Thus, data might be summarized annually for a parameter over each of the last ten years, but be summarized across a ten-year period when data collection first began. The distribution of the data across time should drive how it is summarized.

The impacts from future actions can be predicted using sophisticated models, but these may be impractical for an area as large as the ExROI. Rather, information from current projects should be used to predict what is expected from similar future projects that are likely to occur. In making such predictions, it is important to document what was done, why it was done, and how it was done. This enables results to be reproduced and the Protocol used to be discussed and refined. Prediction of reasonably foreseeable future actions and their impacts should also consider the fluctuation of global economics and the potential for additional mining in the United States to become economically feasible as demand and prices increase in developing countries.

### **Implementation**

The complete characterization of an ExROI to address impacts to widespread interests or resources is a challenging task, but one that is more achievable today than at any previous

time in history because large environmental databases are often available electronically. The challenges lie in finding all the data available; in organizing those data into a common database in such a way that they can be kept current and readily accessible; in identifying, prioritizing, and filling data gaps; and in effective coordination and cooperation among those responsible for the data and those using the data.

As mentioned above, this Protocol can be implemented by the Tribes, Federal agencies, treaty organizations, or other groups, singly or collectively, depending on their shared responsibilities and concerns<sup>5</sup>. This Protocol and the Checklist (Appendix I) focus on the types of data that are needed to characterize an ExROI and suggest initial focus on an AOC to initiate the process on prioritized resources and geographic areas. They also suggest using a GIS to organize, evaluate, and display these environmental data. The Source List (Appendix II) tabulates available online data sources for Minnesota and Michigan that can serve as a starting point for Protocol and Checklist implementation. The next step, which is beyond the scope of this task, would be to establish an efficient mechanism for those responsible for specific data (collection, quality control, updates) to provide on-call access to their data for AOC or ExROI characterization. Interpretation and evaluation of these data should be performed by personnel who are legally and technically qualified to characterize and evaluate impacts to their respective resources.

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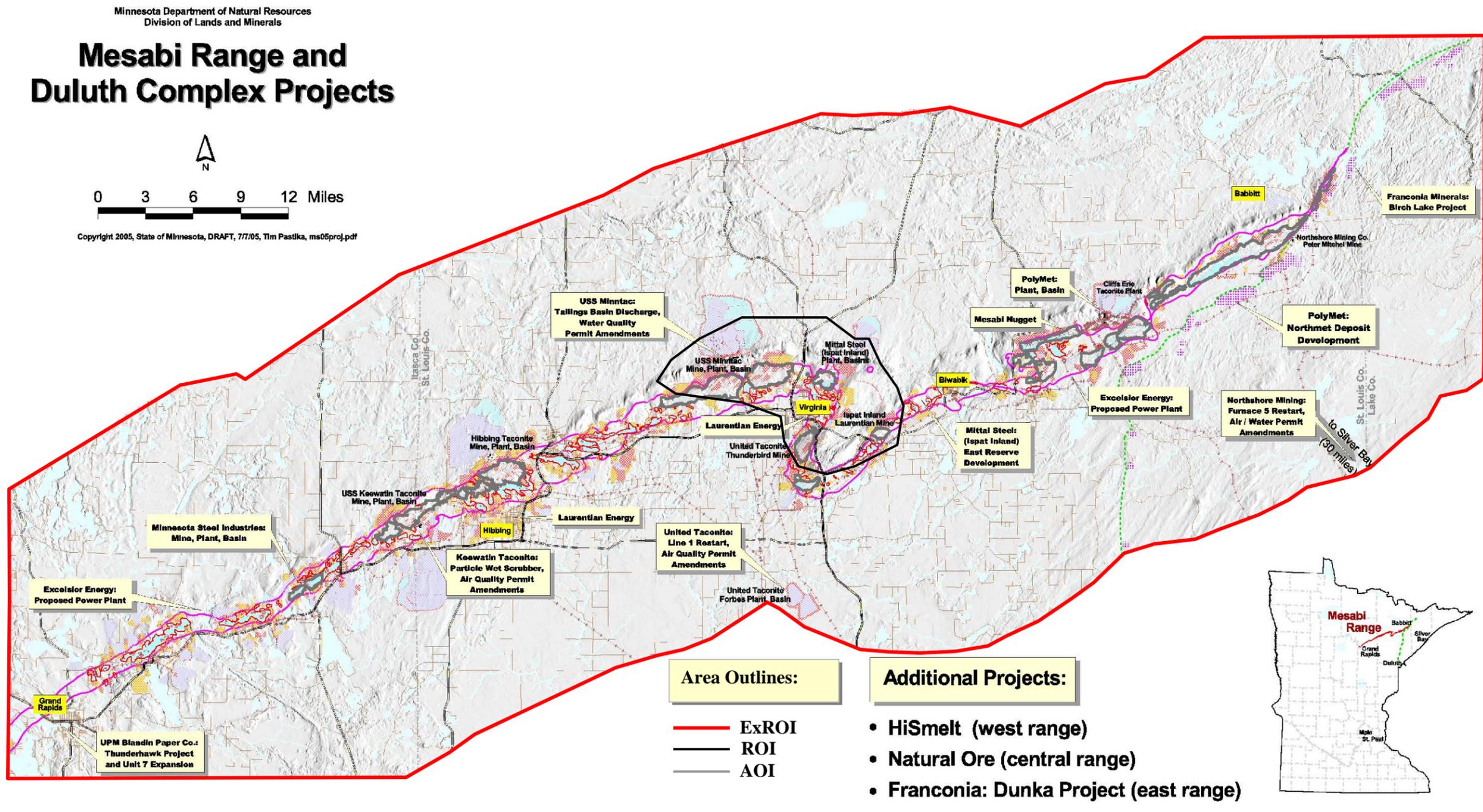
<sup>5</sup> Please note that this Protocol does not replace the need for consultation between the Tribes or other groups and Federal and/or state agencies. It does, however, represent a good starting point for initiation of consultation that effectively addresses impacts to widespread interests or resources.

More specific information on implementing this protocol is provided in Appendix I and Appendix II. Please refer to these appendices to begin implementing this Protocol.

### **References Cited**

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**Attachment 1. An Example to Show the Relative Recommended Size of the Area of Interest (AOI), Region of Influence (ROI), and Expanded Region of Influence (ExROI) Geographic Areas<sup>6</sup>**



<sup>6</sup> Identification of an Area of Concern (AOC) is dependant on the location of specific Tribal resources, which are not identified on this map. The AOC is expected to similar in size to the ROI, but its location and shape will depend on its relationship to the project(s) potentially impacting it and the resources potentially impacted.

**Attachment 2. Extent of Geographic Areas Necessary to Evaluate Cumulative Impacts on Resources and How Resource Subcategories Should be Evaluated<sup>7,8</sup>**

| <b>Resource</b>           | <b>Area of Influence (AOI)</b>  | <b>Region of Influence (ROI)</b>  | <b>Expanded Region of Influence (ExROI)<sup>9</sup></b>   |
|---------------------------|---|---|---|
| Resource Subcategory      | (project-specific impact)   | (project cumulative impact)   | (Tribal cumulative impact)  |
| <b>Air Resources</b>      | <ul style="list-style-type: none"> <li>▪ Base AOI on nearest data stations and extent of undispersed contaminants</li> </ul>  | <ul style="list-style-type: none"> <li>▪ Base ROI on extent of collective undispersed contaminants for those emissions associated with the project and include nearest downwind Class I area</li> </ul> | <ul style="list-style-type: none"> <li>▪ Base ExROI on an area encompassing the aggregate of Tribal lands plus a buffer, if needed, to include collective undispersed contaminants and include nearest downwind Class I areas</li> </ul>  |
| Meteorology               | <ul style="list-style-type: none"> <li>▪ Briefly characterize climate; focus on characteristics that influence dispersion such as prevailing winds, upslope/downslope conditions, and inversions</li> </ul>                                 | <ul style="list-style-type: none"> <li>▪ As for AOI plus local and regional airshed considerations</li> </ul>   | <ul style="list-style-type: none"> <li>▪ As for AOI plus local and regional airshed considerations</li> <li>▪ Consider impacts that would diminish ecosystem functionality</li> </ul>   |
| Emissions and Air Quality | <ul style="list-style-type: none"> <li>▪ Address project-specific emissions, their effect on air quality, and compliance with regulations</li> <li>▪ Include attainment/non-attainment status</li> <li>▪ Include viewshed issues</li> </ul> | <ul style="list-style-type: none"> <li>▪ As for AOI but address collective emissions within ROI for project-associated chemicals</li> </ul>   | <ul style="list-style-type: none"> <li>▪ As for AOI but address collective emissions, attainment, and viewshed within ExROI for all emissions that are regulated or affect quality of life</li> <li>▪ Note any historic changes in air quality</li> <li>▪ Consider impacts that would diminish ecosystem functionality</li> </ul> |

<sup>7</sup> In each case where a potential impact is identified, consider how it could be mitigated (first how it could be avoided, then how it could be minimized and how any residual impact could be compensated for or justified). For some resources, exclusion zones could be established or land trades could be brokered.

<sup>8</sup> Note that under individual natural resources, impacts to that resource are considered. Tribal uses of each resource and impacts to such uses are addressed under Cultural Resources.

<sup>9</sup> Areas of Concern (AOCs) are not included in this table because they are simply focal points within the ExROI

where the collection of information is deemed most important or pressing because of the high priority of their resources or uses and the impending or collective impacts of activities that threaten those resources or uses.

## Attachment 2. Extent of Geographic Areas Necessary to Evaluate Cumulative Impacts on Resources and How Resource Subcategories Should be Evaluated<sup>7,8</sup>

| Resource                  | Area of Influence (AOI)  | Region of Influence (ROI)   | Expanded Region of Influence (ExROI) <sup>9</sup>  |
|---------------------------|--|---|--|
| Resource Subcategory      | (project-specific impact)  | (project cumulative impact)   | (Tribal cumulative impact)   |
| <b>Geologic Resources</b> | <ul style="list-style-type: none"> <li>▪ Base AOI on area to be disturbed by project</li> </ul>  | <ul style="list-style-type: none"> <li>▪ Base ROI on the area of collective disturbance for the proposed project and other nearby projects that affect similar geologic resources</li> </ul>                | <ul style="list-style-type: none"> <li>▪ Base ExROI on the extent of collective disturbance within area that encompasses the aggregate of Tribal lands</li> </ul>  |
| Geologic Strata           | <ul style="list-style-type: none"> <li>▪ Briefly characterize geologic history. Focus on strata that are unstable and cross reference to Aesthetics discussion where unique structures would be discussed</li> </ul>   | <ul style="list-style-type: none"> <li>▪ As for AOI but across larger ROI area</li> </ul>   | <ul style="list-style-type: none"> <li>▪ As for AOI, but across still larger ExROI area</li> <li>▪ Consider extent of disturbance to topography and the fabric of the landscape</li> <li>▪ Consider whether impacts would diminish ecosystem functionality</li> <li>▪ Evaluate significance of the impact versus the benefit of development</li> </ul> |
| Paleontology              | <ul style="list-style-type: none"> <li>▪ Address fossils that are known or likely to be present in the AOI and their significance (local, regional, and national)</li> </ul>   | <ul style="list-style-type: none"> <li>▪ As for AOI, but across larger ROI area</li> </ul>  | <ul style="list-style-type: none"> <li>▪ As for AOI but across still larger ExROI area</li> <li>▪ Consider the extent to which the disturbance alters the natural fabric of the landscape</li> <li>▪ Consider whether impacts would diminish ecosystem functionality</li> </ul>  |
| Soils                     | <ul style="list-style-type: none"> <li>▪ Briefly characterize soils</li> <li>▪ Focus on soil characteristics such as erodibility, instability, corrosivity; particularly if the results of these characteristics cannot be avoided or fully mitigated</li> </ul> | <ul style="list-style-type: none"> <li>▪ As for AOI, but across larger ROI area</li> <li>▪ Note potential for interplay of characteristics such as erosion or instability from multiple projects</li> </ul> | <ul style="list-style-type: none"> <li>▪ As for AOI, but across still larger ExROI</li> <li>▪ Note expanded potential for collective effects from characteristics such as erosion or instability</li> <li>▪ Consider whether impacts would diminish ecosystem functionality</li> </ul>   |

**Attachment 2. Extent of Geographic Areas Necessary to Evaluate Cumulative Impacts on Resources and How Resource Subcategories Should be Evaluated<sup>7,8</sup>**

| <b>Resource</b>                                       | <b>Area of Influence (AOI)</b>   | <b>Region of Influence (ROI)</b>  | <b>Expanded Region of Influence (ExROI)<sup>9</sup></b>   |
|---|--|---|---|
| Resource Subcategory                                  | (project-specific impact)  | (project cumulative impact)   | (Tribal cumulative impact)  |
| <b>Water Resources</b>                                | <ul style="list-style-type: none"> <li>▪ Base AOI on area disturbed by project plus extent of area affected by incompletely mitigated substantive affects on water quality</li> </ul>  | <ul style="list-style-type: none"> <li>▪ Base ROI on watershed(s) within which project lies plus watersheds containing projects with the same effluents and that connect to the project watershed. Also include extent of area affected by incompletely mitigated substantive affects on water quality.</li> </ul>  | <ul style="list-style-type: none"> <li>▪ Base ExROI on outer boundary of aggregated watersheds within which aggregated Tribal lands fall plus extent of area affected by incompletely mitigated substantive affects on water quality</li> </ul>   |
| Groundwater   | <ul style="list-style-type: none"> <li>▪ Briefly characterize extent and depth of groundwater</li> <li>▪ Focus on recharge, aquifers that might be impacted, and uses for drinking water, agriculture, or maintenance of surface water systems.</li> </ul>   | <ul style="list-style-type: none"> <li>▪ As for AOI, but across larger ROI area</li> <li>▪ Note the collective effect that multiple projects, each with same type of effect as the proposed project, might have on groundwater</li> </ul>   | <ul style="list-style-type: none"> <li>▪ As for AOI, but across still larger ExROI</li> <li>▪ Note the collective effect that all projects in the ExROI might have on groundwater</li> <li>▪ Note any historic changes in groundwater extent, depth, and uses</li> <li>▪ Consider whether impacts would diminish ecosystem functionality</li> </ul>   |
| Surface Water (Streams, Lakes, Floodplains, Wetlands) | <ul style="list-style-type: none"> <li>▪ Briefly characterize the streams, lakes, and floodplains in the AOI</li> <li>▪ Focus on those that are important by virtue of their size, abundance, or important uses (e.g., wild rice harvesting; filtration, sedimentation, and capture of surface flow; ecosystem support). Also consider how any changes in floodplain might affect current uses.</li> <li>▪ Evaluate direct disturbance of wetlands by the proposed project as</li> </ul> | <ul style="list-style-type: none"> <li>▪ As for AOI, but across larger ROI area</li> <li>▪ Note the collective effect that multiple projects, each with same type of effect as the proposed project, might have on surface water</li> <li>▪ Note the collective effects multiple projects would have on the types of wetlands impacted by the proposed project</li> </ul> | <ul style="list-style-type: none"> <li>▪ As for AOI, but across still larger ExROI</li> <li>▪ Note the collective effect that all projects in the ExROI might have on surface water</li> <li>▪ Note the collective effects all projects would have on the abundance, distribution, and types of surface water bodies, as well as on their uses by people and ecosystems</li> <li>▪ Note any historic changes in surface water abundance, type, and uses</li> <li>▪ Consider whether impacts would diminish ecosystem functionality</li> </ul> |

**Attachment 2. Extent of Geographic Areas Necessary to Evaluate Cumulative Impacts on Resources and How Resource Subcategories Should be Evaluated<sup>7,8</sup>**

| Resource   | Area of Influence (AOI)<br>(project-specific impact)  | Region of Influence (ROI)<br>(project cumulative impact)  | Expanded Region of Influence (ExROI) <sup>9</sup><br>(Tribal cumulative impact)   |
|--|---|---|---|
| Resource Subcategory   |   |   |   |
| Water Quality (Groundwater and Surface Water)                      | <p>well as indirect effects from soil erosion, altered surface or ground water availability or quality.</p> <ul style="list-style-type: none"> <li>▪ Evaluate impacts on water rights and in-stream uses.</li> <li>▪ Briefly characterize the current quality of groundwater and surface water.</li> <li>▪ Focus on changes in quality resulting from proposed project effluent, erosion, and sedimentation. Address individual chemicals and synergistic effects among chemicals.</li> </ul> | <ul style="list-style-type: none"> <li>▪ As for AOI, but across larger ROI area.</li> <li>▪ Note the collective effects of multiple projects with regard to effluent, erosion, and sedimentation associated with the proposed project. Note any synergistic effects that chemicals from one project might have on chemicals from other projects.</li> </ul> | <ul style="list-style-type: none"> <li>▪ As for AOI, but across still larger ExROI</li> <li>▪ Note the collective effects of all projects, including effects that are additive, might act synergistically, or that might neutralize each other</li> <li>▪ Focus particularly on changes in water quality that might affect current uses of water (e.g., for wild rice growth, drinking water, agriculture, ecosystem support, and cultural use)</li> <li>▪ Identify key locations where existing or new data would be useful in protecting what is downgradient or in determining contaminant sources</li> <li>▪ Note any historic changes in water quality</li> <li>▪ Consider whether impacts would diminish ecosystem functionality</li> </ul> |
| Vegetation (cross reference Wetlands in Water Resource discussion) | <ul style="list-style-type: none"> <li>▪ Base AOI on the area of project disturbance plus a buffer where vegetation might incur impacts from dust or undispersed emissions</li> </ul>   | <ul style="list-style-type: none"> <li>▪ Base ROI on the area of collective disturbance for the proposed project and other nearby projects that affect similar plant communities plus a buffer, as for the AOI</li> </ul>   | <ul style="list-style-type: none"> <li>▪ Base ExROI on the extent of collective disturbance within area that encompasses the aggregate of Tribal lands plus a buffer, as for the AOI</li> </ul>   |
| Grasslands   | <ul style="list-style-type: none"> <li>▪ Briefly characterize</li> </ul>  | <ul style="list-style-type: none"> <li>▪ As for AOI, but across</li> </ul>  | <ul style="list-style-type: none"> <li>▪ As for AOI, but across still</li> </ul>  |

**Attachment 2. Extent of Geographic Areas Necessary to Evaluate Cumulative Impacts on Resources and How Resource Subcategories Should be Evaluated<sup>7,8</sup>**

| <b>Resource</b>          | <b>Area of Influence (AOI)</b>   | <b>Region of Influence (ROI)</b>  | <b>Expanded Region of Influence (ExROI)<sup>9</sup></b>   |
|--------------------------|--|---|---|
| Resource Subcategory     | (project-specific impact)  | (project cumulative impact)   | (Tribal cumulative impact)  |
|                          | the grasslands within the AOI<br>▪ Focus on project-specific impacts to their acreage, relative abundance, uses by people, role in ecosystems, and importance  | larger ROI area<br>▪ Note the collective effect multiple projects would have on the grasslands affected by the proposed project   | larger ExROI<br>▪ Note the collective effect all projects would have on the grassland characteristics within the ExROI<br>▪ Note any historic changes in grassland extent, diversity, complexity, and uses<br>▪ Consider whether impacts would diminish ecosystem functionality   |
| Shrublands               | ▪ As for grasslands  | ▪ As for grasslands   | ▪ As for grasslands   |
| Deciduous Forests        | ▪ As for grasslands  | ▪ As for grasslands   | ▪ As for grasslands   |
| Coniferous Forests       | ▪ As for grasslands  | ▪ As for grasslands   | ▪ As for grasslands   |
| <b>Fish and Wildlife</b> | ▪ Base AOI on the AOI for the habitat occupied by animal taxa of interest that use the proposed project area or vicinity. Thus:<br>○ The AOI for fish and other aquatic species would be the same as for the surface water resources where they are found<br>○ The AOI for amphibians would be the same as for fish and other aquatic species, but would also include upland areas where some species might aestivate<br>○ The AOI for reptiles would include their year-around habitat<br>○ The AOI for birds and mammals | ▪ As for AOI, base ROI on the ROI for the habitat occupied by animal taxa of interest that use the site or vicinity of the proposed project or other projects<br>▪ When evaluating the collective impacts of several projects, consider the mobility of some animal species (especially birds and mammals) and their use of multiple habitats for different aspects of their life cycle | ▪ As for AOI, base ExROI on an area that encompasses the aggregate of Tribal lands plus additional lands identified<br>▪ As for ROI, consider species mobility and use of multiple habitats<br>▪ Extend this logic to consider importance of ExROI individuals of animal taxa of interest to the larger population of which they are a part |

**Attachment 2. Extent of Geographic Areas Necessary to Evaluate Cumulative Impacts on Resources and How Resource Subcategories Should be Evaluated<sup>7,8</sup>**

| Resource                       | Area of Influence (AOI)   | Region of Influence (ROI)   | Expanded Region of Influence (ExROI) <sup>9</sup>  |
|--------------------------------|---|---|--|
| Resource Subcategory           | (project-specific impact)   | (project cumulative impact)   | (Tribal cumulative impact)   |
|                                | <p>would include the habitat they occupy on the project site plus other habitat within the home range of individuals that use the project site for an important component of their life cycle.</p>  |   |  |
| Fish and Other Aquatic Species | <ul style="list-style-type: none"> <li>▪ Briefly describe important species and food chains</li> <li>▪ Focus on impacts to game species, populations, and food webs</li> <li>▪ Cross-reference water resources, especially water quality</li> </ul> | <ul style="list-style-type: none"> <li>▪ As for AOI, but across larger ROI area</li> <li>▪ Note impacts of other projects to same species that proposed project would impact</li> <li>▪ Consider uses of various habitats and how multiple projects affect them</li> </ul>              | <ul style="list-style-type: none"> <li>▪ As for AOI, but across still larger ExROI</li> <li>▪ Note impacts of all development on viability of sustainable populations of all food web species</li> <li>▪ Note impacts of all development on viability of rich and diverse ecosystem</li> <li>▪ Note any historic changes in fish and other aquatic species' populations or habitat</li> <li>▪ Consider whether impacts would diminish ecosystem functionality</li> </ul> |
| Amphibians <sup>10</sup>       | <ul style="list-style-type: none"> <li>▪ Briefly describe important species and food chains</li> <li>▪ Focus on impacts to populations and food webs</li> <li>▪ Cross-reference water resources, especially water quality</li> </ul>                | <ul style="list-style-type: none"> <li>▪ As for AOI but across larger ROI area</li> <li>▪ Also address upland aestivation/ feeding areas and travel routes from there to breeding ponds in context of multiple project impacts on species to be affected by proposed project</li> </ul> | <ul style="list-style-type: none"> <li>▪ As for AOI but across still larger ExROI</li> <li>▪ Address breeding ponds, upland use areas, travel routes across ExROI</li> <li>▪ Note any historic changes in amphibian populations or habitat</li> <li>▪ Consider whether impacts would diminish ecosystem functionality</li> </ul>   |
| Reptiles <sup>6</sup>          | <ul style="list-style-type: none"> <li>▪ Briefly describe important species and</li> </ul>  | <ul style="list-style-type: none"> <li>▪ As for AOI, but across</li> </ul>  | <ul style="list-style-type: none"> <li>▪ As for AOI, but across still</li> </ul>   |

<sup>10</sup> As for fish and other aquatic species, consider terrestrial taxa collectively within ExROI regarding impacts of all development on viability of sustainable populations of all food web species. Note impacts of all development on viability of rich and diverse ecosystem.

**Attachment 2. Extent of Geographic Areas Necessary to Evaluate Cumulative Impacts on Resources and How Resource Subcategories Should be Evaluated<sup>7,8</sup>**

| <b>Resource<br/>Resource<br/>Subcategory</b> | <b>Area of Influence<br/>(AOI)<br/>(project-specific impact)</b>  | <b>Region of Influence<br/>(ROI)<br/>(project cumulative<br/>impact)</b>   | <b>Expanded Region of<br/>Influence (ExROI)<sup>9</sup><br/>(Tribal cumulative impact)</b>   |
|--|---|--|--|
| Birds <sup>6</sup>                           | <p>food chains</p> <ul style="list-style-type: none"> <li>▪ Focus on impacts to populations, and food webs</li> <li>▪ Briefly describe important species and food chains</li> <li>▪ Focus on impacts to populations and food webs, especially top of web species like raptors</li> <li>▪ Consider affect of project site on wide-ranging species that may uses other areas too</li> </ul> | <p>larger ROI area</p> <ul style="list-style-type: none"> <li>▪ Note any special use areas such as hibernacula that, if affected by one project, could impact population using several project areas</li> <li>▪ Focus on species affected by proposed project</li> <li>▪ As for AOI, but across larger ROI area</li> <li>▪ Note impacts of multiple projects on special use areas such as nest and roost trees for species affected by proposed project</li> <li>▪ Consider effect of multiple projects on species affected by proposed project</li> </ul> | <p>larger ExROI</p> <ul style="list-style-type: none"> <li>▪ As for ROI, note population distribution and habitat use across ExROI, and areas of importance to populations of all species</li> <li>▪ Note any historic changes in reptile populations or habitat</li> <li>▪ Consider whether impacts would diminish ecosystem functionality</li> <li>▪ As for AOI, but across still larger ExROI</li> <li>▪ Note impacts of all development on all species</li> <li>▪ Because of large number of species, organize species into feeding guilds and select one member (most sensitive, having most data) of each guild to represent it</li> <li>▪ Note any historic changes in avian populations or habitat</li> <li>▪ Consider whether impacts would diminish ecosystem functionality</li> </ul> |
| Mammals <sup>6</sup>                         | <ul style="list-style-type: none"> <li>▪ Briefly describe important species and food chains</li> <li>▪ Focus on impacts to game species, populations, and food webs, especially top of web species like carnivores</li> <li>▪ Consider affect of project site on wide-ranging species that may uses other areas</li> </ul>  | <ul style="list-style-type: none"> <li>▪ As for AOI, but across larger ROI area</li> <li>▪ Note impacts of multiple projects on special use areas such as calving grounds and fawning areas for species affected by proposed project</li> <li>▪ Consider effect of multiple projects on species affected by proposed project</li> </ul>  | <ul style="list-style-type: none"> <li>▪ As for AOI, but across still larger ExROI</li> <li>▪ Note impacts of all development on all species</li> <li>▪ Because of large number of species, focus on game mammals and key representative food web species</li> <li>▪ Note any historic changes in avian populations or</li> </ul>  |

**Attachment 2. Extent of Geographic Areas Necessary to Evaluate Cumulative Impacts on Resources and How Resource Subcategories Should be Evaluated<sup>7,8</sup>**

| Resource                                   | Area of Influence (AOI)<br>(project-specific impact)  | Region of Influence (ROI)<br>(project cumulative impact)   | Expanded Region of Influence (ExROI) <sup>9</sup><br>(Tribal cumulative impact)  |
|--|---|--|--|
| Resource Subcategory                       |   |  |  |
| <b>Threatened/Endangered (T/E) Species</b> | <ul style="list-style-type: none"> <li>▪ Establish AOI as for vegetation or fish and wildlife, as appropriate</li> </ul>  | <ul style="list-style-type: none"> <li>▪ Establish ROI as for vegetation or fish and wildlife, as appropriate</li> <li>▪ Additionally, incorporate any critical habitat present for species known or likely to be present</li> </ul>   | <p>habitat</p> <ul style="list-style-type: none"> <li>▪ Consider whether impacts would diminish ecosystem functionality</li> <li>▪ Establish ExROI as for vegetation or fish and wildlife, as appropriate</li> <li>▪ Additionally, incorporate any critical habitat present for species known or likely to be present</li> </ul>   |
| Plants <sup>2</sup>                        | <ul style="list-style-type: none"> <li>▪ Coordinate with U.S. Fish and Wildlife Service (USFWS) and determine need for Biological Assessment</li> <li>▪ Evaluate as for other vegetation, but addressing all listed species present or likely to be present</li> <li>▪ Additionally, determine whether critical habitat is present for species known or likely to be present</li> </ul> | <ul style="list-style-type: none"> <li>▪ As for AOI and other vegetation, but across larger ROI area</li> <li>▪ Additionally, determine whether critical habitat is present for species known or likely to be present in any of the multiple project areas considered collectively</li> <li>▪ Note availability of potential habitat and document records of occurrence</li> </ul> | <ul style="list-style-type: none"> <li>▪ As for AOI, ROI, and other vegetation, but across still larger ExROI</li> <li>▪ Consider potential across entire ExROI for every T/E species known or likely to be present and the effects of development on such areas</li> <li>▪ Note any historic changes in populations or habitat for each T/E plant species</li> <li>▪ Consider whether impacts would diminish ecosystem functionality</li> </ul> |
| Animals <sup>2</sup>                       | <ul style="list-style-type: none"> <li>▪ As for fish and wildlife and T/E plants</li> </ul>   | <ul style="list-style-type: none"> <li>▪ As for fish and wildlife and T/E plants</li> </ul>  | <ul style="list-style-type: none"> <li>▪ As for fish and wildlife and T/E plants</li> <li>▪ Particularly note role that diminishing species play as harbingers of impacts on less sensitive species</li> <li>▪ Note any historic changes in populations or habitat for each T/E animal species</li> <li>▪ Consider whether impacts would diminish ecosystem functionality</li> </ul>   |
| <b>Cultural Resources</b>                  | <ul style="list-style-type: none"> <li>▪ Base AOI on area of direct project</li> </ul>  | <ul style="list-style-type: none"> <li>▪ Base ROI on the area of collective disturbance for the proposed project</li> </ul>  | <ul style="list-style-type: none"> <li>▪ Base ExROI on the extent of collective disturbance within area that</li> </ul>  |

**Attachment 2. Extent of Geographic Areas Necessary to Evaluate Cumulative Impacts on Resources and How Resource Subcategories Should be Evaluated<sup>7,8</sup>**

| <b>Resource</b>      | <b>Area of Influence (AOI)</b>  | <b>Region of Influence (ROI)</b>   | <b>Expanded Region of Influence (ExROI)<sup>9</sup></b>   |
|----------------------|---|--|---|
| Resource Subcategory | (project-specific impact)   | (project cumulative impact)  | (Tribal cumulative impact)  |
|                      | disturbance   | and other nearby projects that affect the same cultural resources  | encompasses the aggregate of Tribal lands<br>■ Also include a buffer that incorporates the ExROI for natural resources (see all resources above) that provide the context for traditional cultural properties and uses by the Tribes included in the primary ExROI    |
| Archeology           | ■ Address project impacts to artifacts from direct and indirect disturbance           | ■ As for AOI, but across larger ROI area<br>■ Note the collective effect multiple projects would have on the types of archeological artifacts affected by the proposed project | ■ As for AOI, but across still larger ExROI<br>■ Note the collective effect all projects would have on the archeological resources within the ExROI<br>■ Note whether development through time has impacted certain types of archeological resources more than others |
| Historic Properties  | ■ Address project impacts to historic properties from direct and indirect disturbance | ■ As for AOI, but across larger ROI area<br>■ Note the collective effect multiple projects would have on the types of historic properties affected by the proposed project     | ■ As for AOI, but across still larger ExROI<br>■ Note the collective effect all projects would have on the historic resources within the ExROI<br>■ Note whether development through time has impacted certain types of historic resources more than others           |

**Attachment 2. Extent of Geographic Areas Necessary to Evaluate Cumulative Impacts on Resources and How Resource Subcategories Should be Evaluated<sup>7,8</sup>**

| <b>Resource</b>  | <b>Area of Influence (AOI)</b>  | <b>Region of Influence (ROI)</b>  | <b>Expanded Region of Influence (ExROI)<sup>9</sup></b>  |
|--|---|---|--|
| Resource Subcategory   | (project-specific impact)   | (project cumulative impact)   | (Tribal cumulative impact)   |
| <b>Traditional Cultural Properties and Uses</b>                                | <ul style="list-style-type: none"> <li>▪ Address project impacts to traditional cultural properties and uses from direct and indirect disturbance</li> <li>▪ Include consideration of ongoing use and importance of these properties and that disturbance of their natural context may diminish them, even if they are not physically harmed</li> </ul> | <ul style="list-style-type: none"> <li>▪ As for AOI, but across larger ROI area</li> <li>▪ Note the collective effect multiple projects would have on the types of traditional cultural properties and uses affected by the proposed project</li> </ul> | <ul style="list-style-type: none"> <li>▪ As for AOI, but across still larger ExROI</li> <li>▪ Note the collective effect all projects would have on the traditional cultural properties and uses within the ExROI</li> <li>▪ Note whether development through time has impacted certain types of traditional cultural properties and uses more than others</li> <li>▪ Determine whether cultural uses of water might be affected by changes in water quality</li> <li>▪ Consider the spiritual and cultural significance of potential impacts on plant species that are important to cultural traditions and on animal species (e.g., eagles and wolves) that are important to such important cultural traditions as clan totems</li> <li>▪ Consider whether impacts would diminish ecosystem functionality and its cultural significance</li> </ul> |
| <b>Land Use (including farmlands, sugarbushes, and balsam-gathering lands)</b> | <ul style="list-style-type: none"> <li>▪ Base the AOI on the area of direct and indirect impact for the resource(s) with the largest AOI (likely air resources, water resources, fish and wildlife, or socioeconomic resources)</li> </ul>  | <ul style="list-style-type: none"> <li>▪ Base the ROI on the area of direct and indirect impact for the resource(s) with the largest ROI (likely air resources, water resources, fish and wildlife, or socioeconomic resources)</li> </ul>              | <ul style="list-style-type: none"> <li>▪ Base the ExROI on the area of direct and indirect impact for the resource(s) with the largest ExROI (likely air resources, water resources, fish and wildlife, or socioeconomic resources)</li> </ul>   |
| <b>Ownership Patterns</b>  | <ul style="list-style-type: none"> <li>▪ Note who owns the land to be directly or indirectly disturbed by the project</li> </ul>  | <ul style="list-style-type: none"> <li>▪ As for AOI, but across larger ROI area</li> <li>▪ Note whether—when projects are considered collectively—they</li> </ul>   | <ul style="list-style-type: none"> <li>▪ As for AOI, but across still larger ExROI</li> <li>▪ Note whether—when all projects are considered collectively—they</li> </ul>   |

**Attachment 2. Extent of Geographic Areas Necessary to Evaluate Cumulative Impacts on Resources and How Resource Subcategories Should be Evaluated<sup>7,8</sup>**

| <b>Resource</b>                             | <b>Area of Influence (AOI)</b>  | <b>Region of Influence (ROI)</b>  | <b>Expanded Region of Influence (ExROI)<sup>9</sup></b>  |
|---|---|---|--|
| Resource Subcategory                        | (project-specific impact)   | (project cumulative impact)   | (Tribal cumulative impact)   |
| Treaty Lands and Their Uses                 | <ul style="list-style-type: none"> <li>▪ Note whether the proposed project directly or indirectly impacts any resources on Treaty Lands</li> <li>▪ Compare the impacts in other resource AOIs with the extent of Treaty Lands impacted by the project and note where these overlap</li> </ul>   | <p>differentially affect certain types of ownership affected by the proposed project</p> <ul style="list-style-type: none"> <li>▪ As for AOI, but across larger ROI area</li> <li>▪ Note whether—when projects are considered collectively—they differentially affect certain of the types of treaty lands affected by the proposed project</li> </ul>  | <p>differentially affect certain types of ownership</p> <ul style="list-style-type: none"> <li>▪ Evaluate how changes in ownership affect access to treaty and culturally important resources</li> <li>▪ As for AOI, but across still larger ExROI</li> <li>▪ Note whether—when all projects are considered collectively—they differentially affect certain of the types of treaty lands</li> <li>▪ Consider impacts on Treaty Land ecosystems as well as on individual resources, particularly in the context of traditional uses of Treaty Lands</li> <li>▪ Note whether development through time has impacted certain types of Treaty Lands and their uses more than others</li> <li>▪ Consider whether impacts would diminish ecosystem functionality</li> </ul> |
| <b>Socioeconomics</b>                       | <ul style="list-style-type: none"> <li>▪ Base AOI on smallest geographic area that:                             <ul style="list-style-type: none"> <li>○ Encompasses the proposed project</li> <li>○ Includes the social system and economic system influenced by the proposed project</li> <li>○ Is the basis for relevant data summaries (e.g., a census data polygon or county)</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>▪ Base ROI on next largest geographic area that:                             <ul style="list-style-type: none"> <li>○ Includes the social system and economic system influenced by the proposed project, and other projects that influence these same systems</li> <li>○ Is the basis for relevant data summaries (e.g., a census data polygon or county)</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>▪ Base ExROI on an area that encompasses the aggregate of Tribal lands</li> <li>▪ Expand this area as needed to be consistent with a polygon that is the basis for data collection</li> </ul>   |
| Infrastructure (e.g., cities, towns, roads, | <ul style="list-style-type: none"> <li>▪ Provide a brief summary of the</li> </ul>  | <ul style="list-style-type: none"> <li>▪ As for AOI, but across</li> </ul>  | <ul style="list-style-type: none"> <li>▪ As for AOI, but across still</li> </ul>   |

**Attachment 2. Extent of Geographic Areas Necessary to Evaluate Cumulative Impacts on Resources and How Resource Subcategories Should be Evaluated<sup>7,8</sup>**

| <b>Resource</b>                                   | <b>Area of Influence (AOI)</b>  | <b>Region of Influence (ROI)</b>  | <b>Expanded Region of Influence (ExROI)<sup>9</sup></b>   |
|---|---|---|---|
| Resource Subcategory                              | (project-specific impact)   | (project cumulative impact)   | (Tribal cumulative impact)  |
| railroads, transmission lines, pipelines, trails) | infrastructure within the AOI<br>▪ Note how the proposed project will affect this infrastructure (e.g., increased traffic, maintenance needs)                           | larger ROI area<br>▪ Note collective impact of projects within the ROI on the types of infrastructure impacted by the project | larger ExROI<br>▪ Note the collective impacts of all projects within the ExROI on infrastructure<br>▪ Summarize historic changes in infrastructure<br>▪ Consider whether impacts would diminish ecosystem functionality |
| Population  | ▪ As for infrastructure<br>▪ Address population attributes (trends; composition by age, sex, and ethnicity; income) and how these would be impacted by proposed project | ▪ As for infrastructure   | ▪ As for infrastructure   |
| Housing   | ▪ As for infrastructure<br>▪ Address types (cost, occupancy) of housing and how these would be impacted by proposed project   | ▪ As for infrastructure   | ▪ As for infrastructure   |
| Employment  | ▪ As for infrastructure<br>▪ Address employment by census sectors and how these would be impacted by proposed project   | ▪ As for infrastructure   | ▪ As for infrastructure<br>▪ In addition, consider whether proposed new projects will use local or imported labor   |
| Services (e.g., schools, police, medical, social) | ▪ As for infrastructure<br>▪ Address adequacy of services for current population and how this would be impacted by proposed project                                     | ▪ As for infrastructure   | ▪ As for infrastructure   |
| Environmental Justice                             | ▪ Use information on population attributes to determine impacts on minority and low-income segments of  | ▪ As for AOI, but across larger ROI area<br>▪ Note collective project impacts on  | ▪ As for AOI, but across still larger ExROI<br>▪ Note collective impacts of all projects on   |

**Attachment 2. Extent of Geographic Areas Necessary to Evaluate Cumulative Impacts on Resources and How Resource Subcategories Should be Evaluated<sup>7,8</sup>**

| <b>Resource</b>      | <b>Area of Influence (AOI)</b>   | <b>Region of Influence (ROI)</b>   | <b>Expanded Region of Influence (ExROI)<sup>9</sup></b>   |
|----------------------|--|--|---|
| Resource Subcategory | (project-specific impact)  | (project cumulative impact)  | (Tribal cumulative impact)  |
| Noise                | <p>the population</p> <ul style="list-style-type: none"> <li>▪ Evaluate whether these impacts are disproportionate when compared with the general population</li> <li>▪ Briefly describe the existing noise environment</li> <li>▪ Note how the proposed project would contribute to impacts on people from noise (startle effect, speech interference, sleep interference, physical damage, annoyance)</li> <li>▪ Note also the impacts of noise on fish and wildlife on and near the project site</li> </ul> | <p>environmental justice populations for the specific types of impacts that the proposed project would have</p> <ul style="list-style-type: none"> <li>▪ As for AOI, but across larger ROI area</li> <li>▪ Note the collective contribution of nearby projects to the noise environment if the proposed project would result in noise impacts</li> </ul> | <p>environmental justice populations</p> <ul style="list-style-type: none"> <li>▪ Determine whether there is a disproportionate effect on Tribal populations relative to other environmental justice populations</li> <li>▪ Include impacts on services, economy, cultural resources, and traditional way of life, as well as on the natural resources that support that way of life</li> <li>▪ As for AOI, but across still larger ExROI</li> <li>▪ Note collective contribution of all projects to the noise environment</li> <li>▪ Particularly emphasize the impacts of noise on fish and wildlife populations by interfering with breeding, hunting, and escape mechanisms</li> <li>▪ Also emphasize the impact of noise on the natural setting of traditional use areas</li> <li>▪ Consider whether impacts would diminish ecosystem functionality</li> </ul> |
| Aesthetics           | <ul style="list-style-type: none"> <li>▪ Briefly describe the aesthetic attributes of the project vicinity by cross-referencing discussion on geology, water resources, vegetation, and land use and describing how these resources (individually or in aggregate) contribute to the aesthetics of the</li> </ul>  | <ul style="list-style-type: none"> <li>▪ As for AOI, but across larger ROI area</li> <li>▪ Note the collective impact of the proposed project and other projects on those aesthetic resources that would be impacted by the proposed project</li> </ul>  | <ul style="list-style-type: none"> <li>▪ As for AOI, but across still larger ExROI</li> <li>▪ Note the collective impact of all projects on aesthetic resources in the ExROI</li> <li>▪ Consider impacts to the aesthetics provided by the overall natural setting as well as to those provided by individual resources that are unique</li> </ul>  |

**Attachment 2. Extent of Geographic Areas Necessary to Evaluate Cumulative Impacts on Resources and How Resource Subcategories Should be Evaluated<sup>7,8</sup>**

| <b>Resource</b>      | <b>Area of Influence (AOI)</b>   | <b>Region of Influence (ROI)</b> | <b>Expanded Region of Influence (ExROI)<sup>9</sup></b> |
|----------------------|--|----------------------------------|---|
| Resource Subcategory | (project-specific impact)  | (project cumulative impact)      | (Tribal cumulative impact)                              |
|                      | project setting  |                                  |   |
|                      | <ul style="list-style-type: none"> <li>▪ Note how the proposed project would impact these aesthetic resources</li> </ul> |                                  |   |

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**Attachment 3. Suggested Data for Assessment of Cumulative Impacts Using a Tribal GIS**

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- Meteorological data (e.g., precipitation, temperature, wind speed and direction)
- Air quality in region, specifically related to locations of mining facilities and the downwind Tribal communities and hunting/cultural lands
- Location of paleontological resources, extractable minerals, and areas of geologic or soil instability
- Locations of water resources: streams, rivers, lakes, wetlands, floodplains, groundwater recharge or discharge areas, drinking water sources
- Streamflow and depth to groundwater data
- Water quality: water body classifications and criteria; water quality data for all rivers, streams, lakes, etc.; identified impairments to water bodies; location of National Pollutant Discharge Elimination System (NPDES) permittees, their discharge limits, and water quality data
- Water rights issues
- Sediment quality samples for streams, rivers, lakes, and wetlands
- Location, acreage, and uses of wetlands
- Location and numbers of threatened and endangered vegetation species; locations of herbs and other plants of significance to the Tribes; critical habitats
- Locations and number of threatened and endangered wildlife species; critical habitats
- Location, numbers, migration pathways, breeding areas, overwintering areas, etc. for wildlife of significance to Tribes
- Specific hunting, fishing, and gathering grounds
- Archeological and historical sites of importance
- Locations of traditional cultural properties and uses (i.e., defined so as to protect these sites)
- Distribution of species that are culturally important or important for subsistence harvest
- Ceded territories, identifying reserved rights in each
- Tribal lands
- Wild rice harvesting areas
- Location of prime farmland
- Places (e.g., cities)
- Transportation (e.g., highways, state routes)
- Other infrastructure (e.g., transmission lines, pipelines)
- Proposed urban development in the Mesabi Range area
- Historical, existing, and proposed mining facilities, as well as any industrial facilities (e.g., power plants), in the Mesabi Range area

**APPENDIX I:**  
**CHECKLIST FOR DATA COLLECTION TO ASSESS EXPANDED**  
**CUMULATIVE IMPACTS**  
**(CHECKLIST)**

## **CHECKLIST FOR DATA COLLECTION TO ASSESS EXPANDED CUMULATIVE IMPACTS**

The Protocol to Assess Expanded Cumulative Impacts on Native Americans (Protocol) presents guidance, a general approach, and unique Tribal considerations for assessing cumulative impacts from multiple projects across an expanded region of influence (ExROI). This Checklist for Data Collection to Assess Expanded Cumulative Impacts (Checklist) identifies specific data that should be collected for each resource. However, each Tribe may have somewhat different priorities and concerns, each project may have different impacts on different Tribes, and consultation between the Tribes and Federal/state agencies must still occur. Therefore, this Checklist should be used only as a starting point for collecting data to assess expanded cumulative impacts.

### **How is the Checklist organized?**

Specific steps to follow and information to use in characterizing the affected environment, assessing potential project and cumulative impacts, and developing mitigation measures for the four geographic areas identified in the Protocol (i.e., area of influence [AOI], region of influence [ROI], expanded ROI [ExROI], and area of concern [AOC]) are presented by resource in Tables 1 through Table 9. Major sources for such information are also provided. Additional sources can be found in the Information Source List (Source List) in Appendix II.

### **What format is best to manage the data?**

The suggested information could be obtained in various formats (e.g., paper copy, electronic data files). However, a geographic information system (GIS) that could be accessed by all of the Tribes, Federal agencies, treaty organizations, and other groups

would be an efficient and effective way to understand and use these data. It would facilitate the combination of available data from multiple sources, selection of key locations and resources of particular interest, identification of data gaps, and evaluation of impacts.

Because an ExROI covers a vast area and a large amount of data are needed to characterize it, it is suggested that the Tribes and/or other stakeholders work together and pool their resources to produce a GIS that all can use. The AOC concept provides a starting place for Tribes to begin collecting these data and adding them to the GIS database. Some Tribes, Federal agencies, treaty organizations, and other groups may already have a GIS that contains some of the necessary information.

### **How will the Checklist help me?**

As for the Protocol, this Checklist may assist Federal and state agencies to better understand Tribal concerns and how to incorporate them into cumulative impact assessments. It may also assist Federal, state, and Tribal governments in project scoping and in gathering and evaluating information for cumulative impact assessments. In addition, this document may serve as a template for assessing cumulative impacts to other widespread interests or resources. For such other widespread interests or resources, the Tribal interests and the Mesabi Range that are the focus of this Checklist may be considered as an example used for purposes of discussion. Thus, this Checklist may be useful to Tribes, Federal agencies, treaty organizations, or other groups, singly or collectively, depending on their shared responsibilities and concerns. It will enable early collection of needed data, more effective use of money spent collecting environmental

data, and maintenance of a minimum supply of critical resources, as discussed in more detail in the Protocol.

### **What types of data does the Checklist address?**

To provide a fully developed example of the types of data that may be available and useful, the remainder of this Checklist focuses on implementing the Protocol in the Mesabi Range, the ExROI of interest.

### **What data sources should I use?**

To characterize such an area, local data sources are a good place to start. For example, the Great Lakes Indian Fish and Wildlife Commission (GLIFWC) currently has a GIS available online (<http://www.glifwc-maps.org/>) that can produce maps of the following data:

- Ceded territory
- Tribal lands
- State, National Park Service, U.S. Fish and Wildlife Service (USFWS), and county lands
- Places (e.g., cities)
- Transportation (e.g., highways, state routes)
- Hydrography
- Invasive species: surveys, locations, control efforts.

Additionally, the 1854 Treaty Authority possesses an extensive database for the 1854 Ceded Territory (<http://www.1854authority.org/>), including:

- Ceded territory boundary
- Aerial photos
- Topography maps
- Roads
- Waters
- Land ownership
- Forest types
- Wild rice locations
- Moose harvest locations
- Survey/research project data

- Cultural resource sites.

Individual Tribes may have relevant information as well.

### **Can I use an existing GIS?**

If the primary GIS selected is compatible with other existing GISs maintained by individual Tribes, Federal agencies, treaty organizations, or others, those responsible for these data should be able to combine them and reach an agreement for their joint use. It is not expected that any one or even all collective data sources will be complete. The goal is to compile the data that are available, and identify data gaps where funding and field effort can be focused. The collection of existing and new information from various sources can be prioritized and then implemented as money becomes available. The lists of appropriate, existing, and needed information will change continually as different situations arise, new data are collected, and new potential impacts are identified. Thus, a regular (perhaps quarterly) schedule for reassessing these lists should be established.

### **What is the process to collect data and set up the GIS?**

The following process is suggested to collect data and set up the GIS:

#### *Identify Resource-specific AOCs*

- First, map areas of Tribal importance—i.e., basic geographical data for such parameters as Tribal lands, ceded territory, hunting/fishing grounds, cultural/historical sites, and water resources—onto GIS layers.
- Separate the areas onto different GIS layers by type of use (e.g., lakes, rivers, and wetlands supporting wild rice on one layer; deer hunting areas on another), remembering that such layers can always be combined electronically.
- Combine the areas of Tribal importance with a GIS layer that shows historical, present, and proposed mining facilities and compare them to a GIS layer for each relevant environmental resource.
- Use this information to identify resource-specific AOCs. The AOCs will differ among resources (as described in the Protocol) because the type of impact and its mode of transport will likely vary. Thus, an AOC for water resources might include down drainage areas from the mine to the downstream side of a wetland

where wild rice grows, and the AOC for air resources might include downwind areas from the mine to the downwind side of a place for spiritual solitude, while an AOC for big game might include appropriate habitat between the mine and the far side of all seasonal use areas plus a disturbance buffer. An AOC may also be extended due to less obvious factors, such as when downwind areas are up-drainage from a project; in this case, airborne contaminants may be deposited in waters that are up-drainage from a project, thus impacting a location that at first glance seems unlikely.

*Identify Impacts and Data Needs*

- Once the AOCs have been identified, prioritize them and identify the types of impacts they are subject to from the metal mines.
- Focus the initial collection of data on parameters that quantify the anticipated impacts to top-priority AOCs. For example, the next phase might be to enter all available water quality data.
- To guide data collection, develop a GIS layer that shows where the required data have been collected and who maintains them in a database, then collect any data available in or near the priority AOCs.
- Evaluate the location and type of available water quality data near the AOCs to identify crucial areas where such data are not available and are required to address water quality concerns.
- The GIS data could then be used to define a program to collect data in these key areas.

**Where can I get detailed instructions?**

For each resource, Table 1 shows how to characterize the affected environment, assess potential impacts, and develop mitigation measures. Major data sources and the types of data provided within documentation for specific projects are listed in Table 1. The Source List also identifies a greater number of data sources that are electronically available.

The resource-specific tables include:

Table 1: Air Resources (Meteorology, Emissions and Air Quality)

Table 2: Geologic Resources (Geologic Strata, paleontology, Soils)

- Table 3A: Water Resources (Groundwater and Open Surface Water, Water Quality, Floodplains)
- Table 3B: Wetlands
- Table 4: Vegetation (Grasslands, Shrublands, Deciduous Forests, Coniferous Forests)
- Table 5: Fish & Wildlife (Fish and Other Aquatic Species, Amphibians, Reptiles, Birds, Mammals)
- Table 6: Threatened/Endangered Species (Plants, Animals)
- Table 7: Archeology, Historic Properties, Traditional Cultural Properties and Uses)
- Table 8: Land Use (Specialized Uses (farmlands, sugarbushes, balsam gather lands), Ownership Patterns, Treaty Lands and Their Uses
- Table 9: Socioeconomics (Infrastructure, Population, Housing Services, Employment, Economy, Environmental Justice, noise, Aesthetics).

After evaluating each of these resources individually, they should all be considered collectively so that additive impacts across resources and across time, as well as synergistic effects<sup>11</sup> among resources, can also be evaluated.

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<sup>11</sup> The interaction between two or more "things" when the combined effect is greater than a simple additive effect. In toxicology, synergism refers to the effect caused when exposure to two or more chemicals results in health effects that are greater than the sum of the effects of the individual chemicals.

## RESOURCE-SPECIFIC EXPANDED CUMULATIVE IMPACTS ASSESSMENT CHECKLIST<sup>12</sup>

**Table 1. Expanded Cumulative Impact Assessment Checklist—Air Resources (Meteorology, Emissions, Air Quality)**

| Project AOIs/ROIs   | AOC Relative to Tribal Lands  | Cumulative Impacts Across Mesabi Range ExROI   |
|---|---|--|
| <b>Characterization of the Affected Environment</b>   |   |  |
| <p><b>Step 1:</b> Obtain the following information for the project AOI/ROI:</p> <ul style="list-style-type: none"> <li>• Definition of AOI/ROI (includes proposed mining project and associated airshed at minimum).</li> <li>• Definition of airshed boundaries.</li> <li>• Meteorological data (e.g., wind, temperature, precipitation [rainfall, snowfall], frost-free days).</li> <li>• Local effects of topography or large water bodies on meteorological conditions.</li> <li>• Project features that impact or alter air flow or deposition.</li> <li>• Location of emission sources for the six criteria pollutants with established National Ambient Air Quality Standards and other hazardous air pollutants (HAPs).</li> <li>• Location of any Federal Class I air protection areas in or within 100 kilometers (km) of the AOI/ROI boundary for air.</li> <li>• Location of any nonattainment areas for</li> </ul> | <p><b>Step 1:</b> Define and characterize the AOC<sup>13</sup>, including all airsheds downwind (or otherwise downgradient) of the project and upwind (or upgradient) of or including selected Tribal lands. In addition:</p> <ul style="list-style-type: none"> <li>• Identify the air flow patterns between the project and the selected Tribal lands.</li> <li>• Identify nonattainment or other air quality problem areas, as well as protected Class I areas and associated air quality standards.</li> <li>• Determine desired air quality for Tribal purposes (parameters and concentrations). Formal establishment of more stringent Tribal standards should be done only after careful consideration, as such standards might later be undesirably constraining.</li> <li>• Estimate any change in air quality due to potential discharges from project.</li> <li>• Consider seasonal differences in the severity of potential impacts.</li> </ul> <p><b>Step 2:</b> Obtain closest available air quality monitoring data collected through Federal,</p> | <p><b>Step 1:</b> Develop GIS database to hold all data necessary to evaluate cumulative impacts of mining and other industrial facilities in the Mesabi Range mining area ExROI. Combine resources among Tribes to form one master GIS database that all Tribes can use.</p> <p>It may be possible to start with a copy of the GLIFWC or 1854 Treaty Authority databases and add additional information.</p> <p>The information to include in the GIS database includes:</p> <ul style="list-style-type: none"> <li>• Air resources: locations and names of airsheds, Class I areas, nonattainment areas, etc.</li> <li>• Air quality data: sample locations and results.</li> <li>• Title V, Part 70 and Part 71 operating permit information (name and location of facility, permit number, any parameters that are monitored).</li> <li>• General topographic information.</li> <li>• Location and extent of all historic and</li> </ul> |

<sup>12</sup> The resources addressed in this table are: air resources, geologic resources, water resources (groundwater and open surface water and floodplains, treated separately from wetlands), vegetation, fish and wildlife, threatened/endangered species, cultural resources, land use, and socioeconomic resources.

<sup>13</sup> An AOC may be based on a single environmental resource (e.g., air resources, fish and wildlife resources, other cultural resources) or on several environmental resources that collectively provide the basis for area significance. It is expected that a number of AOCs will be defined within the ExROI and that these may be prioritized so that the most important AOCs can be addressed first, followed by the next most important AOC group, until the entire ExROI is eventually characterized and evaluated.

**Table 1. Expanded Cumulative Impact Assessment Checklist—Air Resources (Meteorology, Emissions, Air Quality)**

|  |   |   |
|--|---|---|
| <p>air pollutants.</p> <p><b>Step 2:</b> Determine the air quality parameters of interest to the Tribe in the AOI/ROI.</p> <p><b>Step 3:</b> Obtain any air quality monitoring data collected through Federal, state, local, or volunteer programs and that are relevant to air quality parameters of interest.</p> <p><b>Step 4:</b> Identify/obtain copies of any air permits (Title V, Part 70 and Part 71 operating permits) in the airshed; all air pollution sources must have such permits if they exceed established minimum standards. In addition:</p> <ul style="list-style-type: none"> <li>• Obtain air quality monitoring data collected for permit compliance.</li> <li>• Compare air quality data to established air quality standards and Tribe’s desired air quality for specific purposes such as human and environmental health and traditional uses.</li> <li>• Review any inspections of permitted facilities and problems identified as relevant to air quality in the airshed.</li> </ul> <p><b>Step 5:</b> Evaluate whether documents related to the project include adequate and appropriate air quality data.</p> | <p>state, local, or volunteer programs for the AOC airshed; extrapolate as needed and appropriate between monitoring stations after considering source locations.</p> <p><b>Step 3:</b> Identify/obtain copies of any Title V, Part 70 and Part 71 operating permits in the airsheds between the project and the selected Tribal lands.</p> <ul style="list-style-type: none"> <li>• Obtain air quality data collected for permits.</li> <li>• Compare air quality data to established air quality standards and Tribe’s desired air quality for specific purposes such as human and environmental health and traditional uses.</li> <li>• Review any inspections of permitted facilities and review problems identified as relevant to airshed.</li> </ul> | <p>current mines, processing, or loading facilities and other industrial facilities in the area.</p> <ul style="list-style-type: none"> <li>• Location of Tribal lands, hunting grounds, wild rice-harvesting areas, Treaty access lands, cultural features, etc.</li> </ul> <p><b>Step 2:</b> Determine logistics of developing the GIS database, including a plan to obtain data, enter them into the system, provide system updates, and perform quality assurance to ensure that data are entered correctly.</p> <p><b>Step 3:</b> Enter available data into system; data can be entered in phases over time based on funding (see sources of information below).</p> <p><b>Step 4:</b> Determine data that are unavailable; assess which of these data are most important—location and type.</p> <p><b>Step 5:</b> Combine resources among Tribes to collect the data deemed most important.</p> |
| <p><b>Sources of Information—Affected Environment:</b></p> <ul style="list-style-type: none"> <li>• Project proposal documents.</li> <li>• National Environmental Policy Act (NEPA) documents and their secondary references on proposed project (if prepared) and on other (past, present, and future) projects affecting the same environmental resources.</li> <li>• EPA: <a href="http://www.epa.gov/ebtpages/air.html">www.epa.gov/ebtpages/air.html</a>.</li> <li>• Minnesota Pollution Control Agency (MnPCA) Air Data: <a href="http://www.pca.state.mn.us/air/index.html">www.pca.state.mn.us/air/index.html</a>.</li> </ul>  | <p><b>Sources of Information—Affected Environment:</b></p> <ul style="list-style-type: none"> <li>• Project proposal documents.</li> <li>• NEPA documents and their secondary references on proposed project (if prepared) and on other (past, present, and future) projects affecting environmental resources.</li> <li>• Required air quality for Tribal uses.</li> <li>• EPA: <a href="http://www.epa.gov/ebtpages/air.html">www.epa.gov/ebtpages/air.html</a>.</li> <li>• MnPCA Air Data: <a href="http://www.pca.state.mn.us/air/index.html">www.pca.state.mn.us/air/index.html</a>.</li> </ul>  | <p><b>Sources of Information—Affected Environment:</b></p> <ul style="list-style-type: none"> <li>• Project proposal documents.</li> <li>• NEPA documents and their secondary references on proposed past, present, and future projects affecting environmental resources throughout the ExROI, including information on AOIs, ROIs, and AOCs.</li> <li>• Required air quality for Tribal uses.</li> <li>• EPA: <a href="http://www.epa.gov/ebtpages/air.html">www.epa.gov/ebtpages/air.html</a>.</li> <li>• MnPCA Air Data:</li> </ul>   |

**Table 1. Expanded Cumulative Impact Assessment Checklist—Air Resources (Meteorology, Emissions, Air Quality)**

- MnPCA Air Toxics Data:  
[www.pca.state.mn.us/air/airtoxics.html](http://www.pca.state.mn.us/air/airtoxics.html).
- MnPCA Environmental Data Access—Air Quality Data:  
[www.pca.state.mn.us/data/edaAir/index.cfm](http://www.pca.state.mn.us/data/edaAir/index.cfm).

*Also see Source List.*

- MnPCA Air Toxics Data:  
[www.pca.state.mn.us/air/airtoxics.html](http://www.pca.state.mn.us/air/airtoxics.html).
- MnPCA Environmental Data Access—Air Quality Data:  
[www.pca.state.mn.us/data/edaAir/index.cfm](http://www.pca.state.mn.us/data/edaAir/index.cfm).

*Also see Source List.*

- [www.pca.state.mn.us/air/index.html](http://www.pca.state.mn.us/air/index.html).
- MnPCA Air Toxics Data:  
[www.pca.state.mn.us/air/airtoxics.html](http://www.pca.state.mn.us/air/airtoxics.html).
- MnPCA Environmental Data Access—Air Quality Data:  
[www.pca.state.mn.us/data/edaAir/index.cfm](http://www.pca.state.mn.us/data/edaAir/index.cfm).
- National, statewide or local GIS databases, including such online sources as: GIS Data Depot-- <http://data.geocomm.com/> and USDA Data Gateway--  
<http://datagateway.nrcs.usda.gov/>.

*Also see Source List.*

**Assessment of Potential Impacts**

- Step 1:** Review project proposal and the literature to become familiar with potential impacts that could occur from a project of the type proposed.
- Step 2:** Review project description to ensure that sufficient detail on emissions is provided to enable determination of impacts to air quality and local microclimate.
- Step 3:** Evaluate potential impacts to air resources from the proposed project when considered alone (AOI) or with other facilities having the same emissions (ROI), including:
- Changes in air quality that may result from operations and emissions of criteria pollutants or HAPs.
  - Changes in air quality due to unregulated substances.
  - Changes in local microclimate that may result from water vapor or heat in emissions.
  - Impacts on Class I areas within 100 km of air quality AOI/ROI.

- Step 1:** Review NEPA documents (if any) and other reports and studies that describe mining or other projects (proposed, past, present, and future) within the AOC or upgradient from it.
- Step 2:** Review discussions of potential or actual impacts to air resources from the projects (proposed, past, present, and future) in the area. Develop a list of these impacts and supplement it with any impacts that are not included, but should be.
- Step 3:** Assess how existing air quality in or upgradient from the AOC would be (has been, could be, is) altered by the addition of actual (past or present) or projected contaminant levels (of criteria pollutants, HAPs, or unregulated substances) from projects (proposed, past, present, and future).
- Step 4:** Determine how far the important resources in the AOC are from upgradient sources and impacts to air quality, and how these resources have been, are being, or are likely to be affected.

- Step 1:** Use the GIS to show locations of types of developments and the AOCs identified within the ExROI.
- Step 2:** Use the GIS to map data relevant to air resources across the ExROI, filling in information for the AOCs first and then for the spaces between them when this aids in efficiency or is responsive to funding constraints. Include locations and quantitative data on air quality; Class I areas; major sources contributing to nonattainment; concentrations of criteria pollutants, HAPs, and unregulated substances of concern; and seasonal wind directions (perhaps with separate layers for each of the four seasons and wind roses for data collection locations to show directional percentages). Focus the presentation of data on information illustrating the variability of air quality across the ExROI (rather than on describing the ExROI) and categorize areas as to their existing impacts or sensitivity to impacts.
- Step 3:** Superimpose all relevant project facilities

**Table 1. Expanded Cumulative Impact Assessment Checklist—Air Resources (Meteorology, Emissions, Air Quality)**

- Whether secondary impacts could result from deposition of airborne pollutants on water or soils.

**Step 5:** Whenever possible, use quantitative data to document impacts that have occurred and to illustrate trends that support concern regarding future impacts to air quality. Where data to document air quality impacts are lacking, develop a work plan to collect such data as efficiently as possible (e.g., from key locations, for pollutants of primary concern or their surrogates).

onto existing natural resources to identify locations and types of impacts that may occur where these two systems (built environment and natural environment) overlap.

**Step 4:** Assess whether all of these data were considered in project documents to identify impacts and conduct additional analysis to evaluate potential impacts that were not assessed in NEPA or other documents.

**Step 5:** Use the GIS to identify data gaps and strategic collection locations that will most cost effectively identify air quality impacts and provide data on control locations as well.

**Step 6:** Use the GIS to extrapolate information on impacts across data gaps where this is appropriate given project locations and meteorological gradients.

**Sources of Information–Potential Impacts:**

- Project proposal documents.
- Reports or studies of the air emissions from similar mines/processing facilities.
- Data collected from similar facilities in area.

*Also see Source List.*

**Sources of Information–Potential Impacts:**

- Project proposal documents.
- NEPA or other documents prepared for mining and other industrial facilities in area.
- Reports, studies, or data on the air emissions from facilities in or upgradient from the AOC.

*Also see Source List.*

**Sources of Information–Potential Impacts:**

- Project proposal documents.
- NEPA documents and their secondary references on proposed past, present, and future projects affecting environmental resources throughout the ExROI, including information on AOIs, ROIs, and AOCs.

*Also see Source List.*

**Development of Mitigation Measures**

**Step 1:** Evaluate whether project documents describe measures that would mitigate potential impacts to air resources.

**Step 2:** Review published documents regarding other, similar mining operations in the area to determine the mitigation measures used and the success of these measures (including reclamation and off-site actions)

**Step 1:** Review NEPA and other documents and studies related to mining and other industrial operations in the AOC to determine the mitigation measures used and the success of these measures (including reclamation and off-site actions) in mitigating impacts of air resources.

**Step 2:** Evaluate measures that could mitigate the

**Step 1:** Review NEPA and other documents and studies related to mining and other industrial operations in the area to determine the mitigation measures used and the success of these measures (including reclamation and off-site actions) in mitigating impacts of air resources.

**Step 2:** Evaluate measures that could mitigate the

**Table 1. Expanded Cumulative Impact Assessment Checklist—Air Resources (Meteorology, Emissions, Air Quality)**

|   |  |   |
|---|--|---|
| <p>in mitigating impacts on air resources.</p> <p><b>Step 3:</b> Assess whether proposed mitigation measures are adequate to address potential impacts.</p>   | <p>potential impacts identified for the AOC.</p> <p><b>Step 3:</b> Coordinate closely with MnPCA if impacts are from criteria pollutants, as mitigation measures for these chemicals should be selected collaboratively with this agency.</p>  | <p>potential impacts identified for the ExROI; consider which of the measures identified would be most effective at the geographic scale of the ExROI.</p> <p><b>Step 3:</b> Consider the “reasonable foreseeable future” scenarios developed for various projects during the NEPA process to determine “when” their collective cumulative impacts would be detrimental to Tribal needs and when mitigation should be implemented to be most effective.</p>   |
| <p><b>Sources of Information–Mitigation Measures:</b></p> <ul style="list-style-type: none"> <li>• Project proposal documents.</li> <li>• NEPA and other documents related to this or other similar mining operations in area.</li> <li>• General information regarding mitigation of air quality impacts.</li> </ul> <p><i>Also see Source List.</i></p> | <p><b>Sources of Information–Mitigation Measures:</b></p> <ul style="list-style-type: none"> <li>• Project proposal documents.</li> <li>• NEPA and other documents related to mining and other projects in AOC.</li> <li>• General information regarding mitigation of air quality impacts.</li> <li>• Search Council on Environmental Quality (CEQ) (e.g., <a href="http://www.airquality.org/ceqa/index.shtml">www.airquality.org/ceqa/index.shtml</a>); EPA, MnPCA, and other Web sites for documents regarding mitigation measures appropriate for particular situations.</li> <li>• Search other online site (e.g., California Air Resources Board Statewide Best Available Control Technology [BACT] Clearinghouse-- <a href="http://www.arb.ca.gov/bact/bact.htm">www.arb.ca.gov/bact/bact.htm</a>).</li> </ul> <p><i>Also see Source List.</i></p> | <p><b>Sources of Information–Mitigation Measures:</b></p> <ul style="list-style-type: none"> <li>• Project proposal documents.</li> <li>• NEPA documents and their secondary references on proposed past, present, and future projects affecting environmental resources throughout the ExROI, including information on AOIs, ROIs, and AOCs.</li> <li>• Search CEQ (e.g., <a href="http://www.airquality.org/ceqa/index.shtml">www.airquality.org/ceqa/index.shtml</a>); EPA, MnPCA, and other Web sites for documents regarding mitigation measures appropriate for particular situations.</li> </ul> <p><i>Also see Source List.</i></p> |

**Table 2. Expanded Cumulative Impact Assessment Checklist—Geologic Resources (Geologic Strata, Paleontology, Soils)**

| Project AOIs/ROIs  | AOC Relative to Tribal Lands  | Cumulative Impacts Across Mesabi Range ExROI  |
|--|---|---|
| <b>Characterization of the Affected Environment</b>  |   |   |
| <p><b>Step 1:</b> Define the AOI/ROI for geologic resources. These resources are typically confined to the area disturbed by the proposed project when considered alone (AOI) and together with other projects having similar impacts (ROI), respectively. In some situations, they may be expanded to include outcrops that are visual resources, and unstable areas that are outside the area of disturbance but could impact it.</p> <p><b>Step 2:</b> Obtain the following information for the project AOI/ROI:</p> <ul style="list-style-type: none"> <li>• Definition of AOI/ROI (includes proposed mining project at minimum).</li> <li>• Geologic strata, known or likely paleontological resources, and soils in or immediately adjacent to the AOI/ROI.</li> </ul> <p><b>Step 3:</b> Determine the geologic resources of interest to the Tribe in the AOI/ROI. For example, these may include outcroppings of particular prominence or cultural significance, or paleontological resources of particular meaning.</p> <p><b>Step 4:</b> Beyond geologic resources of particular interest, geologic resources are typically considered because they may impact a project. Therefore, collect data on geologic features that may be unstable and subject to earthquakes or landslides and on such soil characteristics as high shrink/swell,</p> | <p><b>Step 1:</b> Define and characterize the AOC, including geologic resources disturbed by projects and upgradient of or including selected Tribal lands of particular importance. In addition:</p> <ul style="list-style-type: none"> <li>• Identify geologic outcrops visible from the selected Tribal lands and characterize their appearance and Tribal importance.</li> <li>• Determine whether there are any paleontological resources in or near the AOC that are of Tribal significance.</li> </ul> <p><b>Step 2:</b> Describe characteristics of upgradient geologic resources that could affect AOC resources of particular Tribal importance—such as highly erodible soils that, if disturbed, might result in airborne or waterborne particulates, haze, and siltation.</p> | <p><b>Step 1:</b> Develop GIS database to hold all data necessary to evaluate cumulative impacts of mining and other industrial facilities in the Mesabi Range mining area ExROI. Combine resources among Tribes to form one master GIS database that all Tribes can use.</p> <p>It may be possible to start with a copy of the GLIFWC or 1854 Treaty Authority databases and add additional information. The information to include in the GIS database includes:</p> <ul style="list-style-type: none"> <li>• General topographic information.</li> <li>• Location of geologic outcrops, strata known for containing paleontological resources, and areas of geologic instability.</li> <li>• Soils types, particularly those that have characteristics (e.g., high corrosivity, high shrink/swell potential, high water table) that constrain certain types of development or activity.</li> <li>• Location and extent of all historic and current mines, processing, or loading facilities and other industrial facilities in the area.</li> <li>• Location of Tribal lands, hunting grounds, wild rice-harvesting areas, Treaty access lands, cultural features, etc.</li> </ul> <p><b>Step 2:</b> Determine logistics of developing the GIS</p> |

**Table 2. Expanded Cumulative Impact Assessment Checklist—Geologic Resources (Geologic Strata, Paleontology, Soils)**

corrosivity, water table, erodibility, or other characteristics that could preclude construction or require specific engineering solutions.

**Step 5:** Evaluate whether documents related to the project include adequate and appropriate data on geologic resources.

database, including a plan to obtain data, enter them into the system, provide system updates, and perform quality assurance to ensure that data are entered correctly.

**Step 3:** Enter available data into system; data can be entered in phases over time based on funding (see sources of information below).

**Step 4:** Determine data that are unavailable; assess which of these data are most important—location and type.

**Step 5:** Combine resources among Tribes to collect the data deemed most important.

**Sources of Information–Affected Environment:**

- Project proposal documents.
- NEPA documents and their secondary references on proposed project (if prepared) and on other (past, present, and future) projects affecting the same geologic resources.
- Tribal archives on importance of outcroppings and fossil record.
- Geologic Data for MN:  
<http://data.geocomm.com/catalog/US/61055/group23.html>.
- Soils Data in two versions:  
 STATSGO:  
[www.ncgc.nrcs.usda.gov/products/datasets/statsgo/index.html](http://www.ncgc.nrcs.usda.gov/products/datasets/statsgo/index.html).  
 SSURGO:  
[www.ncgc.nrcs.usda.gov/products/datasets/ssurgo/index.html](http://www.ncgc.nrcs.usda.gov/products/datasets/ssurgo/index.html).

*Also see Source List.*

**Sources of Information–Affected Environment:**

- Project proposal documents.
- NEPA documents and their secondary references on proposed project (if prepared) and on other (past, present, and future) projects affecting geologic resources.
- Tribal archives on importance of outcroppings and fossil record.
- Geologic Data for MN:  
<http://data.geocomm.com/catalog/US/61055/group23.html>.
- Soils Data in two versions:  
 STATSGO:  
[www.ncgc.nrcs.usda.gov/products/datasets/statsgo/index.html](http://www.ncgc.nrcs.usda.gov/products/datasets/statsgo/index.html).  
 SSURGO:  
[www.ncgc.nrcs.usda.gov/products/datasets/ssurgo/index.html](http://www.ncgc.nrcs.usda.gov/products/datasets/ssurgo/index.html).

*Also see Source List.*

**Sources of Information–Affected Environment:**

- Project proposal documents.
- NEPA documents and their secondary references on proposed past, present, and future projects affecting geologic resources throughout the ExROI, including information on AOIs, ROIs, and AOCs.
- Tribal archives on importance of outcroppings and fossil record.
- National, statewide or local GIS databases, including such online sources as: GIS Data Depot (<http://data.geocomm.com/>) and USDA Data Gateway (<http://datagateway.nrcs.usda.gov/>).
- Geologic Data for MN:  
<http://data.geocomm.com/catalog/US/61055/group23.html>.
- MN county-specific data with digital elevation models, and orthoimagery for base maps.
- Soils Data in two versions:  
 STATSGO:  
[www.ncgc.nrcs.usda.gov/products/datasets/statsgo/index.html](http://www.ncgc.nrcs.usda.gov/products/datasets/statsgo/index.html).  
 SSURGO:

**Table 2. Expanded Cumulative Impact Assessment Checklist—Geologic Resources (Geologic Strata, Paleontology, Soils)**

[www.ncgc.nrcs.usda.gov/products/datasets/ssurg/o/index.html](http://www.ncgc.nrcs.usda.gov/products/datasets/ssurg/o/index.html).

*Also see Source List.*

| <b>Assessment of Potential Impacts</b>   |  |   |
|--|--|---|
| <p><b>Step 1:</b> Review project proposal and the literature to become familiar with potential impacts that could occur from a project of the type proposed.</p> <p><b>Step 2:</b> Review project description to ensure that sufficient detail is provided to enable determination of impacts to or from geologic resources.</p> <p><b>Step 3:</b> Evaluate potential impacts to or from geologic resources from or to the proposed project when considered alone (AOI) or with other facilities having the same emissions (ROI) including:<br/>                     Destruction of geologic outcrops or paleontological resources.<br/>                     Disturbance of the fabric of the landscape.<br/>                     Siting of facilities in areas where earthquakes or landslides are likely to damage them and could also result in secondary impacts.<br/>                     Damage to facilities by corrosion, shrinking and swelling of the soil, or high water table (i.e., due to underlying soils with these properties).</p> | <p><b>Step 1:</b> Review NEPA documents (if any) and other reports and studies that describe mining or other projects (proposed, past, present, and future) within the AOC or sufficiently close to potentially result in AOC impacts.</p> <p><b>Step 2:</b> Review discussions of potential or actual impacts to or from geologic resources from the projects (proposed, past, present, and future) in the area. Develop a list of these impacts and supplement it with any impacts that are not included but should be. Include disruption of the fabric of the landscape (e.g., a strip mining scar across an unbroken forest) among the impacts considered.</p> <p><b>Step 3:</b> Assess how existing geologic resources upgradient (for air or water flow) or visible from the AOC would be (have been, could be, are) altered by project(s) (proposed, past, present, and future).</p> <p><b>Step 4:</b> Determine how far the important resources in the AOC are from geologic resources that might impact them or that might be impacted by surrounding projects.</p> <p><b>Step 5:</b> Whenever possible, use quantitative data to document impacts that have occurred and to illustrate trends that support concern regarding future impacts to or from geologic resources. For example, if disturbance of locations X miles upstream from areas where wild rice grows has resulted in soil erosion and siltation of wild rice habitat, use this information to document the likelihood of similar impacts on the AOC from projects at a similar</p> | <p><b>Step 1:</b> Use the GIS to show locations of types of developments and the AOCs identified within the ExROI.</p> <p><b>Step 2:</b> Use the GIS to map data relevant to geologic resources across the ExROI, filling in information for the AOCs first and then for the spaces between them when this aids in efficiency or is responsive to funding constraints. Include locations and quantitative data on locations where paleontologic resources have been found. Show the viewshed from viewpoints that are important in Tribal culture, and use software to show what culturally significant outcrops can be seen from culturally important viewpoints. Focus the presentation of data on information illustrating Tribal use across the ExROI (rather than on describing the ExROI) and categorize geologic areas as to their existing or sensitivity to impacts.</p> <p><b>Step 3:</b> Superimpose all relevant project facilities onto existing natural resources to identify locations and types of impacts that may occur where these two systems (built environment and natural environment) overlap.</p> <p><b>Step 4:</b> Assess whether all of these data were considered in project documents to identify impacts and conduct additional analysis to evaluate potential impacts that were not assessed in NEPA or other documents.</p> <p><b>Step 5:</b> Use the GIS to identify data gaps and strategic collection locations that will most</p> |

**Table 2. Expanded Cumulative Impact Assessment Checklist—Geologic Resources (Geologic Strata, Paleontology, Soils)**

|   |   |  |
|---|---|--|
|   | distance.   | cost effectively identify impacts to or from geologic resources.   |
| <p><b>Sources of Information–Potential Impacts:</b></p> <ul style="list-style-type: none"> <li>• Project proposal documents.</li> <li>• Reports or studies of geologic instability close enough to the AOI/ROI to impact them.</li> <li>• Data collected on erosion, landslides, or other earth movement associated with similar facilities in area.</li> </ul> <p><i>Also see Source List.</i></p> | <p><b>Sources of Information–Potential Impacts:</b></p> <ul style="list-style-type: none"> <li>• Project proposal documents.</li> <li>• NEPA or other documents prepared for proposed project and other mining and industrial facilities in the AOC.</li> <li>• Reports or studies of the geologic impacts to or from from projects (proposed, past, present, and future) in the AOC.</li> <li>• Data collected from similar facilities in area.</li> </ul> <p><i>Also see Source List.</i></p> | <p><b>Sources of Information–Potential Impacts:</b></p> <ul style="list-style-type: none"> <li>• Project proposal documents.</li> <li>• NEPA documents and their secondary references on proposed past, present, and future projects affecting environmental resources throughout the ExROI, including information on AOIs, ROIs, and AOCs.</li> </ul> <p><i>Also see Source List.</i></p> |

**Development of Mitigation Measures**

|   |  |  |
|---|--|--|
| <p><b>Step 1:</b> Evaluate whether project documents describe measures that will mitigate potential impacts to or from geologic resources.</p> <p><b>Step 2:</b> Review published documents regarding other, similar mining operations in the area to determine the mitigation measures used and the success of these measures (including reclamation and off-site actions) in mitigating impacts to or from geologic resources.</p> <p><b>Step 3:</b> Assess whether mitigation measures proposed are adequate to address potential impacts.</p> | <p><b>Step 1:</b> Review NEPA and other documents and studies related to mining and other industrial operations in the AOC to determine the mitigation measures used and the success of these measures (including reclamation and off-site actions) in mitigating impacts to or from geologic resources.</p> <p><b>Step 2:</b> Evaluate measures that could mitigate the potential impacts identified for the AOC.</p> | <p><b>Step 1:</b> Review NEPA and other documents and studies related to mining and other industrial operations in the area to determine the mitigation measures used and the success of these measures (including reclamation and off-site actions) in mitigating impacts to or from geologic resources.</p> <p><b>Step 2:</b> Evaluate measures that could mitigate the potential impacts identified for the ExROI; consider which of the measures identified would be most effective at the geographic scale of the ExROI.</p> <p><b>Step 3:</b> Consider the “reasonable foreseeable future” scenarios developed for various projects during the NEPA process to determine “when” their collective cumulative impacts would be detrimental to Tribal needs and when mitigation should be implemented to be most effective.</p> |
|---|--|--|

**Table 2. Expanded Cumulative Impact Assessment Checklist—Geologic Resources (Geologic Strata, Paleontology, Soils)**

**Sources of Information–Mitigation Measures:**

- Project proposal documents.
- NEPA and other documents related to this or other similar mining operations in area.
- General information regarding mitigation of impacts to or from geologic resources.
- Online Web sites providing best management practices (BMPs) associated with erosion control (these BMPs are often developed to address water quality):  
[www.udfcd.org/downloads/download\\_critmanual.htm#vol1](http://www.udfcd.org/downloads/download_critmanual.htm#vol1);  
[www.dot.state.co.us/environmental/envWaterQuality/wqms4.asp](http://www.dot.state.co.us/environmental/envWaterQuality/wqms4.asp);  
[www.pca.state.mn.us/water/pubs/sw-bmpmanual.html](http://www.pca.state.mn.us/water/pubs/sw-bmpmanual.html).

*Also see Source List.*

**Sources of Information–Mitigation Measures:**

- Project proposal documents.
- NEPA and other documents related to this or other similar mining operations in area.
- General information regarding mitigation of impacts to or from geologic resources.
- Online Web sites providing BMPs associated with erosion control (these BMPs are often developed to address water quality):  
[www.udfcd.org/downloads/download\\_critmanual.htm#vol1](http://www.udfcd.org/downloads/download_critmanual.htm#vol1);  
[www.dot.state.co.us/environmental/envWaterQuality/wqms4.asp](http://www.dot.state.co.us/environmental/envWaterQuality/wqms4.asp);  
[www.pca.state.mn.us/water/pubs/sw-bmpmanual.html](http://www.pca.state.mn.us/water/pubs/sw-bmpmanual.html).

*Also see Source List.*

**Sources of Information–Mitigation Measures:**

- Project proposal documents.
- NEPA documents and their secondary references on proposed past, present, and future projects affecting environmental resources throughout the ExROI, including information on AOIs, ROIs, and AOCs.
- Online Web sites providing BMPs associated with erosion control (these BMPs are often developed to address water quality):  
[www.udfcd.org/downloads/download\\_critmanual.htm#vol1](http://www.udfcd.org/downloads/download_critmanual.htm#vol1);  
[www.dot.state.co.us/environmental/envWaterQuality/wqms4.asp](http://www.dot.state.co.us/environmental/envWaterQuality/wqms4.asp);  
[www.pca.state.mn.us/water/pubs/sw-bmpmanual.html](http://www.pca.state.mn.us/water/pubs/sw-bmpmanual.html).

*Also see Source List.*

**Table 3A. Expanded Cumulative Impacts Assessment Checklist—Water Resources (Groundwater and Open Surface Water, Water Quality, Floodplains)**

| Project AOIs/ROIs  | AOC Relative to Tribal Lands  | Cumulative Impacts Across Mesabi Range ExROI   |
|--|---|--|
| <b>Characterization of the Affected Environment</b>  |   |  |
| <p><b>Step 1:</b> Obtain the following information for the project AOI/ROI:</p> <ul style="list-style-type: none"> <li>• Definition of AOI/ROI (includes proposed mining project and associated watershed at minimum).</li> <li>• Watersheds and major rivers, streams, and lakes located in or that flow through the AOI/ROI.</li> <li>• Classes of waters and wetlands and associated water quality standards.</li> <li>• Locations where wild rice or other plants of Tribal significance grow, and where aquatic ecosystems occur.</li> <li>• Water quality required to support wild rice, other plants, and aquatic ecosystems of Tribal significance.</li> <li>• Project features that impact or alter water bodies in watershed.</li> <li>• Precipitation and streamflow data for rivers and streams in watershed.</li> <li>• Regulatory (100-year) floodplains in AOI/ROI that may be impacted by project features.</li> </ul> <p><b>Step 2:</b> Determine the water quality parameters of interest to the Tribe in the AOI/ROI.</p> <p><b>Step 3:</b> Obtain any water quality monitoring data collected for these water bodies through state, local, or volunteer programs, including any local watershed management</p> | <p><b>Step 1:</b> Define and characterize the AOC, including all watersheds downstream (or otherwise downgradient for pollutants) of the project but upstream (or otherwise upgradient for pollutants) of or including selected Tribal lands. In addition:</p> <ul style="list-style-type: none"> <li>• Identify the watershed and major rivers, streams, lakes, and wetlands located in or that flow between the project and the selected Tribal lands.</li> <li>• Identify the classes of waters and wetlands and associated water quality standards.</li> <li>• Identify desired water quality for Tribal purposes (parameters and concentrations).</li> <li>• Determine where wild rice or other plants of Tribal significance grow, and where aquatic ecosystems occur.</li> <li>• Specify water quality required to support wild rice, other plants, and aquatic ecosystems of Tribal significance.</li> <li>• Obtain precipitation and streamflow data for rivers and streams in these watersheds.</li> <li>• Estimate increased/decreased water quantity and any change in water quality due to potential intakes/discharges from project.</li> </ul> | <p><b>Step 1:</b> Develop GIS database to hold all data necessary to evaluate cumulative impacts of mining and other industrial facilities in the Mesabi Range mining area ExROI. Combine resources among Tribes to form one master GIS database that all Tribes can use.</p> <p>It may be possible to start with a copy of the GLIFWC or 1854 Treaty Authority databases and add additional information. The information to include in the GIS database includes:</p> <ul style="list-style-type: none"> <li>• General topographic information.</li> <li>• Water resources: locations and names of watersheds, streams, lakes, etc.</li> <li>• Classes and status (303(d) status) of lakes, streams, etc.</li> <li>• Location and extent of all historic and current mines, processing, or loading facilities and other industrial facilities in the area.</li> <li>• Location of Tribal lands, hunting grounds, wild rice-harvesting areas, Treaty access lands, cultural features, etc.</li> <li>• Wild rice or other plants and aquatic ecosystems of Tribal significance.</li> <li>• Water quality data relative to standards required to support wild rice, other plants, and aquatic ecosystems of</li> </ul> |

**Table 3A. Expanded Cumulative Impacts Assessment Checklist—Water Resources (Groundwater and Open Surface Water, Water Quality, Floodplains)**

|   |  |  |
|---|--|--|
| <p>committees.</p> <p><b>Step 4:</b> Obtain any sediment quality monitoring data collected for water bodies through state, local, or volunteer programs.</p> <p><b>Step 5:</b> Identify and obtain copies of any National Pollutant Discharge Elimination System (NPDES) industrial stormwater discharge permits in watershed; all iron ore mines, as well as other industrial facilities, must have NPDES permits. In association with these permits:</p> <ul style="list-style-type: none"> <li>• Obtain water quality data collected for permits.</li> <li>• Compare water quality data to water quality standards for the stream and the Tribe’s desired water quality (for specific purposes such as enabling wild rice to grow).</li> <li>• Review any inspections of permitted facilities and problems identified as relevant to the watershed.</li> </ul> <p><b>Step 6:</b> Obtain similar information from Underground Injection Control (UIC) Program permits associated with injectate.</p> <p><b>Step 7:</b> Evaluate whether documents related to the project include adequate and appropriate water quality data.</p> | <ul style="list-style-type: none"> <li>• Consider seasonal differences in the severity of potential impacts.</li> </ul> <p><b>Step 2:</b> Obtain any water quality monitoring data collected for these water bodies through state, local, or volunteer programs, including any local watershed management committees (and participate in such committees).</p> <p><b>Step 3:</b> Identify and obtain copies of any NPDES industrial stormwater discharge permits in the watersheds between the project and the selected Tribal lands; all iron ore mines, as well as other industrial facilities, must have NPDES permits. In association with these permits:</p> <ul style="list-style-type: none"> <li>• Obtain water quality data collected for permits.</li> <li>• Compare water quality data to water quality standards for the stream and the Tribe’s desired water quality (for specific purposes such as enabling wild rice to grow).</li> <li>• Review any inspections of permitted facilities and problems identified as relevant to the watershed.</li> <li>• Obtain similar information from Underground Injection Control (UIC) Program permits associated with injectate.</li> </ul> | <p>Tribal significance.</p> <ul style="list-style-type: none"> <li>• Water quality data: sample locations and results.</li> <li>• Sediment quality data: sample locations and results.</li> <li>• NPDES permit information: name and location of facility, permit number, any parameters that are monitored in stormwater.</li> </ul> <p><b>Step 2:</b> Determine logistics of developing the GIS database, including a plan to obtain data, enter them into the system, provide system updates, and perform quality assurance to ensure that data are entered correctly.</p> <p><b>Step 3:</b> Enter available data into system; data can be entered in phases over time based on funding (see sources of information below).</p> <p><b>Step 4:</b> Determine data that are unavailable; assess which of these data are most important—location and type.</p> <p><b>Step 5:</b> Combine resources among tribes to collect the data deemed most important.</p> |
| <p><b>Sources of Information—Affected Environment:</b></p> <ul style="list-style-type: none"> <li>• Project proposal documents.</li> <li>• NEPA documents and their secondary references on proposed project (if prepared) and on other (past, present, and future) projects affecting the same water resources.</li> </ul>   | <p><b>Sources of Information—Affected Environment:</b></p> <ul style="list-style-type: none"> <li>• Project proposal documents.</li> <li>• NEPA documents and their secondary references on proposed project (if prepared) and on other (past, present, and future) projects affecting water resources.</li> </ul>   | <p><b>Sources of Information—Affected Environment:</b></p> <ul style="list-style-type: none"> <li>• Project proposal documents.</li> <li>• MnPCA water quality data: <a href="http://www.pca.state.mn.us/data/index.html">www.pca.state.mn.us/data/index.html</a> and <a href="http://www.pca.state.mn.us/data/eda/index.cfm">www.pca.state.mn.us/data/eda/index.cfm</a>.</li> <li>• MnPCA sediment data:</li> </ul>   |

**Table 3A. Expanded Cumulative Impacts Assessment Checklist—Water Resources (Groundwater and Open Surface Water, Water Quality, Floodplains)**

|  |  |   |
|--|--|---|
| <ul style="list-style-type: none"> <li>• Required water quality for Tribal uses.</li> <li>• MnPCA: watershed maps, stream classes, water quality standards, water quality data, permit information, inspection reports.</li> <li>• U.S. Geological Society (USGS): precipitation and streamflow data, water quality data.</li> </ul> <p><i>Also see Source List.</i></p> | <ul style="list-style-type: none"> <li>• Required water quality for Tribal uses.</li> <li>• MnPCA: watershed maps, stream classes, water quality standards, water quality data, permit information, inspection reports.</li> <li>• USGS: precipitation and streamflow data, water quality data.</li> </ul> <p><i>Also see Source List.</i></p> | <ul style="list-style-type: none"> <li><a href="http://www.pca.state.mn.us/water/sediments/index.html">www.pca.state.mn.us/water/sediments/index.html</a>.</li> <li>• MnPCA impaired waters: <a href="http://www.pca.state.mn.us/water/tmdl/index.html">www.pca.state.mn.us/water/tmdl/index.html</a>.</li> <li>• MnPCA basins and watersheds: <a href="http://www.pca.state.mn.us/water/basins/index.html">www.pca.state.mn.us/water/basins/index.html</a>.</li> <li>• USGS streamflow and water quality: <a href="http://water.usgs.gov/">http://water.usgs.gov/</a>.</li> <li>• Minnesota precipitation data: <a href="http://climate.umn.edu/doc/historical.htm">http://climate.umn.edu/doc/historical.htm</a>.</li> <li>• Great Lakes Indian Fish and Wildlife Commission: <a href="http://www.glifwc-maps.org/">www.glifwc-maps.org/</a>.</li> <li>• National, statewide or local GIS databases, including such online sources as: GIS Data Depot (<a href="http://data.geocomm.com/">http://data.geocomm.com/</a>) and <a href="http://www.usda.gov/data_gateway/">USDA Data Gateway</a> (<a href="http://datagateway.nrcs.usda.gov/">http://datagateway.nrcs.usda.gov/</a>).</li> </ul> <p><i>Also see Source List.</i></p> |
|--|--|---|

**Assessment of Potential Impacts**

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|---|--|---|
| <p><b>Step 1:</b> Review project proposal and the literature to become familiar with potential impacts that could occur from a project of the type proposed.</p> <p><b>Step 2:</b> Review project description to ensure that sufficient detail is provided on effluents, stormwater control, construction practices, and site restoration to enable determination of impacts to water quantity and quality.</p> <p><b>Step 3:</b> Evaluate potential impacts to water resources from the proposed project when considered alone (AOI) or with other facilities having the same impacts on water resources (ROI), including:</p> <ul style="list-style-type: none"> <li>• Changes in water quality that may result from operations and discharges at mine</li> </ul> | <p><b>Step 1:</b> Review NEPA documents (if any) and other reports and studies that describe mining or other project (proposed, past, present, and future) within the AOC or upgradient from it.</p> <p><b>Step 2:</b> Review discussions of potential or actual impacts to water resources from the projects (proposed, past, present, and future) in the area. Develop a list of these impacts and supplement it with any impacts that are not included, but should be. Consider the possibility that water quality up drainage from a project could be impacted by deposition of airborne contaminants if winds blow up drainage.</p> <p><b>Step 2:</b> Assess how existing water quality</p> | <p><b>Step 1:</b> Use the GIS to show locations of types of developments and the AOCs identified within the ExROI.</p> <p><b>Step 2:</b> Use the GIS to map data relevant to water resources across the ExROI, filling in information for the AOCs first and then for the spaces between them when this aids in efficiency or is responsive to funding constraints. Include locations and quantitative data on rivers, streams, lakes, ponds, bogs, and other water bodies as well as established locations for water quality sampling. Focus the presentation of data on information illustrating Tribal use and importance across the ExROI (rather than on describing the ExROI), and categorize water resources as to their existing or</p> |
|---|--|---|

**Table 3A. Expanded Cumulative Impacts Assessment Checklist—Water Resources (Groundwater and Open Surface Water, Water Quality, Floodplains)**

|   |  |   |
|---|--|---|
| <p>(wastewater).</p> <ul style="list-style-type: none"> <li>• Changes in quantity and quality of stormwater that may run off site.</li> <li>• Changes to water bodies resulting from mine/mine facility construction or operation.</li> </ul> <p>Changes in water quality due to erosion or unregulated substances (e.g., reduction in dissolved organic carbon or a shift in a stream’s alkalinity due to replacement of groundwater with stormwater).</p> | <p>upgradient from the AOC would be (has been, could be, is) altered by the addition of actual (past or present) or projected contaminant levels from projects (proposed, past, present, and future).</p>  | <p>sensitivity to impacts.</p>  |
| <p><b>Step 4:</b> Evaluate potential impact of encroachments or alterations of floodplains in AOI/ROI.</p>  | <p><b>Step 3:</b> Evaluate changes in water quality due to erosion or unregulated substances (e.g., reduction in dissolved organic carbon or a shift in a stream’s alkalinity due to replacement of groundwater with stormwater).</p>  | <p><b>Step 3:</b> Superimpose all relevant project facilities onto existing natural resources to identify locations and types of impacts that may occur where these two systems (built environment and natural environment) overlap.</p>                          |
|   | <p><b>Step 4:</b> Determine how far the important resources in the AOC are from upgradient sources and impacts to water quality or quantity and how these resources have been, are being, or are likely to be affected.</p>  | <p><b>Step 4:</b> Assess whether all of these data were considered in project documents to identify impacts and conduct additional analysis to evaluate potential impacts that were not assessed in NEPA or other documents.</p>                                  |
|   | <p><b>Step 5:</b> Whenever possible, use quantitative data to document impacts that have occurred and to illustrate trends that support concern regarding future impacts to water quantity, quality, or flow. Where data to document water resource impacts are lacking, develop a work plan to collect such data as efficiently as possible (e.g., from key locations, for pollutants of primary concern or their surrogates). As part of documenting impacts, include data collection points upgradient and downgradient from expected contaminant sources to provide background data and verify source locations.</p> | <p><b>Step 5:</b> Use the GIS to identify data gaps and strategic collection locations that will most cost effectively identify impacts to or from water resources.</p>   |
| <p><b>Sources of Information–Potential Impacts:</b></p>   | <p><b>Sources of Information–Potential Impacts:</b></p>  | <p><b>Sources of Information–Potential Impacts:</b></p>   |
| <ul style="list-style-type: none"> <li>• Project proposal documents.</li> <li>• Reports or studies of the water quality discharges from similar mines/processing facilities.</li> <li>• UIC Program permits for projects with direct</li> </ul>   | <ul style="list-style-type: none"> <li>• Project proposal documents.</li> <li>• NEPA or other documents prepared for proposed project and other mining and industrial facilities in area.</li> <li>• Reports or studies of the water quality</li> </ul>  | <ul style="list-style-type: none"> <li>• Project proposal documents.</li> <li>• NEPA documents prepared for proposed projects and other facilities (proposed, past, present, and future) throughout the area (including information in AOIs, ROIs, and</li> </ul> |

**Table 3A. Expanded Cumulative Impacts Assessment Checklist—Water Resources (Groundwater and Open Surface Water, Water Quality, Floodplains)**

|   |   |  |
|---|---|--|
| <p>underground discharges through UIC wells.</p> <ul style="list-style-type: none"> <li>• Data collected from similar facilities in area.</li> <li>• Stormwater studies or guidelines that estimate the increase in stormwater runoff from development (increases in impervious area) in the vicinity of the Mesabi Range.</li> </ul> <p><i>Also see Source List.</i></p>   | <p>discharges from facilities in or upgradient from the AOC.</p> <ul style="list-style-type: none"> <li>• UIC Program permits for projects with direct underground discharges through UIC wells upgradient from the AOC.</li> <li>• Data collected from other facilities in area.</li> </ul> <p><i>Also see Source List.</i></p>  | <p>AOCs).</p> <ul style="list-style-type: none"> <li>• Permit compliance reports associated with discharges of projects and other facilities (proposed, past, present, and future).</li> </ul> <p><i>Also see Source List.</i></p>   |
| <p><b>Development of Mitigation Measures</b></p>  |   |  |
| <p><b>Step 1:</b> Evaluate whether project documents describe measures that will mitigate potential impacts to water resources.</p> <p><b>Step 2:</b> Review published documents regarding other, similar mining operations in the area to determine the mitigation measures used and the success of these measures (including reclamation and off-site actions) in mitigating impacts of water resources.</p> <p><b>Step 3:</b> Assess whether mitigation measures proposed are adequate to address potential impacts.</p> | <p><b>Step 1:</b> Review NEPA and other documents and studies related to mining and other industrial operations in the AOC to determine the mitigation measures used and the success of these measures (including reclamation and off-site actions) in mitigating impacts to water resources.</p> <p><b>Step 2:</b> Evaluate measures that could mitigate the potential impacts identified for the AOC.</p> | <p><b>Step 1:</b> Review NEPA and other documents and studies related to mining and other industrial operations in the area to determine the mitigation measures used and the success of these measures (including reclamation and off-site actions) in mitigating impacts of water resources.</p> <p><b>Step 2:</b> Evaluate measures that could mitigate the potential impacts identified for the ExROI; consider which of the measures identified would be most effective at the geographic scale of the ExROI. Identify other groups for whom healthy water resources are a priority (e.g., environmental groups, bird watchers, fishermen, canoeing enthusiasts, tourists) and work to forge alliances to implement and maintain mitigation measures that collectively benefit the groups in the alliance.</p> <p><b>Step 3:</b> Consider the “reasonable foreseeable future” scenarios developed for various projects during the NEPA process to determine “when” their collective cumulative impacts would be detrimental to Tribal needs and when mitigation should be implemented to be most effective.</p> |
| <p><b>Sources of Information–Mitigation Measures:</b></p> <ul style="list-style-type: none"> <li>• Project proposal documents.</li> </ul>   | <p><b>Sources of Information–Mitigation Measures:</b></p> <ul style="list-style-type: none"> <li>• Project proposal documents.</li> </ul>   | <p><b>Sources of Information–Mitigation Measures:</b></p> <ul style="list-style-type: none"> <li>• Project proposal documents.</li> </ul>  |

**Table 3A. Expanded Cumulative Impacts Assessment Checklist—Water Resources (Groundwater and Open Surface Water, Water Quality, Floodplains)**

- NEPA and other documents related to this or other similar mining operations in area.
- General information regarding mitigation of water quality and quantity impacts.

*Also see Source List.*

- NEPA and other documents related to mining and other operations in AOC.
- General information regarding mitigation of water quality, quantity, and flow impacts.
- EPA and U.S. Army Corps of Engineers (USACE) documents on mitigation measures.

*Also see Source List.*

- NEPA documents prepared for projects (proposed, past present, future) throughout the ExROI.
- Online Web sites providing BMPs associated with erosion control (these BMPs are often developed to address water quality):  
[www.udfcd.org/downloads/down\\_critmanual.htm#voll](http://www.udfcd.org/downloads/down_critmanual.htm#voll);  
[www.dot.state.co.us/environmental/envWaterQuality/wqms4.asp](http://www.dot.state.co.us/environmental/envWaterQuality/wqms4.asp);  
[www.pca.state.mn.us/water/pubs/sw-bmpmanual.html](http://www.pca.state.mn.us/water/pubs/sw-bmpmanual.html).
- EPA (e.g., [www.epa.gov/ebtpages/watwaterpollutioncontrol.html](http://www.epa.gov/ebtpages/watwaterpollutioncontrol.html)) and USACE (e.g., [www.usace.army.mil/cw/hot\\_topics/rglmitigation.htm](http://www.usace.army.mil/cw/hot_topics/rglmitigation.htm)) documents on mitigation measures.

*Also see Source List.*

**Table 3B. Expanded Cumulative Impacts Assessment Checklist—Wetlands**

| Project AOIs/ROIs  | AOC Relative to Tribal Lands   | Cumulative Impacts Across Mesabi Range ExROI   |
|--|--|--|
| <b>Characterization of the Affected Environment</b>  |  |  |
| <p><b>Step 1:</b> In addition to obtaining the water resources information listed above, obtain the following wetland information for the AOI/ROI:</p> <ul style="list-style-type: none"> <li>• Uses and functions of wetlands.</li> <li>• Jurisdictional status of wetlands, per USACE and/or state wetland programs; the jurisdictional status of all wetlands that would be disturbed by the proposed project should be determined.</li> <li>• Project features that would impact or alter wetlands (including information needed for any 404 permits to fill).</li> </ul> <p><b>Step 2:</b> Determine the wetland parameters of interest to the Tribe in the AOI/ROI.</p> <p><b>Step 3:</b> Present any wetland water quality standards and monitoring data collected by state, local, or volunteer programs.</p> <p><b>Step 4:</b> Describe the existing environment relative to these standards and attributes of interest, and with regard to any permits needed to allow wetlands to be impacted and how these might relate to protection of Tribal interests.</p> <p><b>Step 5:</b> Evaluate whether documents related to the proposed project include adequate and appropriate wetland data.</p> | <p><b>Step 1:</b> In addition to obtaining the water resources information listed above, the following wetland information is required to define and characterize the AOC:</p> <ul style="list-style-type: none"> <li>• Locations and attributes of wetlands (including ownership) in the watersheds that lie between the project and the selected Tribal lands.</li> <li>• Jurisdictional wetlands, per USACE and/or state wetland programs. It would be useful to know the jurisdictional status of all wetlands in the AOC, as this will help determine the legal protection to which they are entitled and might also support Tribal interests.</li> <li>• Project features that will impact or alter wetlands.</li> </ul> <p><b>Step 2:</b> Present wetland water quality standards and monitoring data collected for the wetlands identified above by state, local, or volunteer programs.</p> <p><b>Step 3:</b> Fully characterize the wetland attributes of interest to the Tribes in the AOC.</p> | <p><b>Step 1:</b> Identify wetland locations for the entire Mesabi range and enter into GIS.</p> <p><b>Step 2:</b> Enter locational and attribute data for the following into GIS:</p> <ul style="list-style-type: none"> <li>• Jurisdictional wetlands, per USACE and/or state wetland programs.</li> <li>• Project features that will impact or alter wetlands.</li> </ul> <p><b>Step 3:</b> Enter all wetland water quality information into GIS integrated database (required standards and actual data), including sediment data.</p> <p><b>Step 4:</b> Focus the presentation of wetland data on attributes of Tribal significance.</p> <p><b>Step 4:</b> Determine data that are unavailable; assess which of these data are most important—location and type.</p> <p><b>Step 5:</b> Combine resources with other Tribes, agencies, or interest groups to collect the data deemed most important.</p> |
| <p><b>Sources of Information—Affected Environment:</b></p> <ul style="list-style-type: none"> <li>• Project proposal documents.</li> <li>• Proposed project NEPA document.</li> </ul>  | <p><b>Sources of Information—Affected Environment:</b></p> <ul style="list-style-type: none"> <li>• Project proposal documents.</li> <li>• Proposed project NEPA document (if prepared).</li> </ul>  | <p><b>Sources of Information—Affected Environment:</b></p> <ul style="list-style-type: none"> <li>• Project proposal documents.</li> <li>• MnPCA wetland information, including wetland water quality standards and monitoring:</li> </ul>   |

**Table 3B. Expanded Cumulative Impacts Assessment Checklist—Wetlands**

| Project AOIs/ROIs  | AOC Relative to Tribal Lands   | Cumulative Impacts Across Mesabi Range ExROI   |
|--|--|--|
| <ul style="list-style-type: none"> <li>• Required water quality for Tribal uses.</li> <li>• Wetland water quality standards and data for AOI/ROI.</li> <li>• MnPCA: watershed and wetland maps for AOI/ROI.</li> </ul> | <ul style="list-style-type: none"> <li>• Required water quality for Tribal uses in AOC.</li> <li>• Wetland water quality standards and data for AOC.</li> <li>• MnPCA: watershed and wetland maps in AOC.</li> </ul> <p><i>Also see Source List.</i></p> | <p><a href="http://www.pca.state.mn.us/water/wetlands/index.html">www.pca.state.mn.us/water/wetlands/index.html</a></p> <ul style="list-style-type: none"> <li>• MnPCA sediment data: <a href="http://www.pca.state.mn.us/water/sediments/index.html">www.pca.state.mn.us/water/sediments/index.html</a>.</li> <li>• MnPCA impaired waters: <a href="http://www.pca.state.mn.us/water/tmdl/index.html">www.pca.state.mn.us/water/tmdl/index.html</a>.</li> <li>• MnPCA basins and watersheds: <a href="http://www.pca.state.mn.us/water/basins/index.html">www.pca.state.mn.us/water/basins/index.html</a>.</li> <li>• Great Lakes Indian Fish and Wildlife Commission: <a href="http://www.glifwc-maps.org/">www.glifwc-maps.org/</a>.</li> </ul> |
| <p><i>Also see Source List.</i></p>  |  |  |

*Also see Source List.*

**Assessment of Potential Impacts**

**Step 1:** Review project proposal to determine potential impacts to wetlands that project proponents identified and review the literature to ensure that all potential impacts have been included.

**Step 2:** Evaluate potential impacts to wetlands in defined AOI/ROI such as the following:

- Changes in water quality that may result from operations and discharges at mine (wastewater).
- Changes in quantity and quality of stormwater that may run off site and enter wetlands.
- Changes to wetlands resulting from mine and/or mine facility construction or operation.
- Changes in water quality due to unregulated substances (e.g., reduction in dissolved organic carbon or a shift in a stream’s alkalinity due to replacement of groundwater with

**Step 1:** Review NEPA documents (if any) and other reports and studies that discuss potential or actual impacts to wetlands from the project and other mining or industrial facilities in the area.

**Step 2:** Assess how existing water quality in wetlands in the AOC would be (has been, could be, is) altered by the addition of projected contaminant levels from proposed project(s).

**Step 3:** Evaluate changes in water quality of wetlands due to unregulated substances (e.g., reduction in dissolved organic carbon or a shift in a stream’s alkalinity due to replacement of groundwater with stormwater), and how these changes could affect wetland uses and functions.

**Step 4:** Assess how any projected increased/decreased flow from project(s) will affect wetlands in the AOC.

**Step 5:** Evaluate potential impact of encroachments or alterations of floodplains in the AOC on

**Step 1:** Use the GIS database to map wetland data in the Mesabi Range.

**Step 2:** Evaluate whether all of these data were considered in the project documents.

**Step 3:** Assess how existing water quality in wetlands in the AOC will be altered by the addition of projected or measured contaminant levels from project.

**Step 4:** Evaluate changes in water quality of wetlands due to unregulated substances and how these changes may impact uses and functions of wetlands.

**Step 5:** Conduct additional analysis to evaluate potential impacts that were not assessed in NEPA or other documents prepared for the project(s); include AOCs outside of the area assessed for the project(s), if applicable.

**Step 6:** Evaluate potential impact of encroachments or alterations of floodplains in ExROI on wetlands.

**Table 3B. Expanded Cumulative Impacts Assessment Checklist—Wetlands**

| Project AOIs/ROIs   | AOC Relative to Tribal Lands   | Cumulative Impacts Across Mesabi Range ExROI  |
|---|--|---|
| <p>stormwater), and how these changes will affect wetland uses, habitats, and vegetation.</p>   | <p>wetlands.</p>   |   |
| <p><b>Step 3:</b> Evaluate potential impact of encroachments or alterations of floodplains in AOI/ROI on wetlands.</p>  |  |   |
| <p><b>Sources of Information–Potential Impacts:</b></p> <ul style="list-style-type: none"> <li>• Project proposal documents.</li> <li>• Reports or studies of the water quality changes in wetlands from similar mines/processing facilities.</li> <li>• Data collected in wetlands from similar facilities in area by state, local, or volunteer organizations.</li> </ul> <p><i>Also see Source List.</i></p> | <p><b>Sources of Information–Potential Impacts:</b></p> <ul style="list-style-type: none"> <li>• Project proposal documents.</li> <li>• NEPA or other documents prepared for proposed project(s) and other mining and industrial facilities in area.</li> <li>• Reports or studies of the water quality changes in wetlands from similar mines/processing facilities.</li> <li>• Data collected in wetlands from similar facilities in AOC by state, local, or volunteer organizations.</li> </ul> <p><i>Also see Source List.</i></p> | <p><b>Sources of Information–Potential Impacts:</b></p> <ul style="list-style-type: none"> <li>• Project proposal documents.</li> <li>• NEPA and other documents prepared for proposed project(s) and other mining and industrial facilities in area.</li> <li>• Reports or studies of the water quality changes in wetlands from similar mines/processing facilities.</li> <li>• GIS database.</li> <li>• MnPCA websites.</li> </ul> <p><i>Also see Source List.</i></p> |
| <p><b>Development of Mitigation Measures</b></p>  |  |   |
| <p><b>Step 1:</b> Evaluate whether project documents describe measures that will mitigate potential impacts to wetlands.</p>  | <p><b>Step 1:</b> Review NEPA and other documents and studies related to mining and other industrial operations in the area to determine the mitigation measures used and the success of these measures (including reclamation and off-site actions) in mitigating impacts to wetlands.</p>  | <p><b>Step 1:</b> Review NEPA and other documents and studies related to mining and other industrial operations in the area to determine the mitigation measures used and the success of these measures (including reclamation and off-site actions) in mitigating impacts to wetlands.</p>   |
| <p><b>Step 2:</b> Review published documents regarding other, similar mining operations in area to determine the mitigation measures used and the success of these measures (including reclamation and off-site actions) in mitigating impacts to wetlands.</p>   | <p><b>Step 2:</b> Evaluate mitigation measures that could mitigate the potential impacts identified for the AOC (request assistance from state, EPA).</p>  | <p><b>Step 2:</b> Evaluate measures that could mitigate the potential impacts identified for the ExROI; consider which of the measures identified would be most effective at the geographic scale of the ExROI. Identify other groups for whom healthy wetlands are a priority (e.g., environmental groups, bird watchers, fishermen, tourists) and work to forge</p>   |
| <p><b>Step 3:</b> Assess if mitigation measures proposed are adequate to address potential impacts to wetlands (request assistance from state, EPA).</p>  |  |   |

**Table 3B. Expanded Cumulative Impacts Assessment Checklist—Wetlands**

| Project AOIs/ROIs  | AOC Relative to Tribal Lands   | Cumulative Impacts Across Mesabi Range ExROI   |
|--|--|--|
| <p><b>Sources of Information–Mitigation Measures:</b></p> <ul style="list-style-type: none"> <li>• Project proposal documents.</li> <li>• NEPA and other documents related to this or other, similar mining operations in area.</li> <li>• General information regarding mitigation of impacts to wetlands.</li> </ul> <p><i>Also see Source List.</i></p> | <p><b>Sources of Information–Mitigation Measures:</b></p> <ul style="list-style-type: none"> <li>• Project proposal documents.</li> <li>• NEPA and other documents related to mining and other projects in the AOC.</li> <li>• General information regarding mitigation of wetland impacts.</li> <li>• EPA and USACE documents regarding mitigation measures.</li> </ul> <p><i>Also see Source List.</i></p> | <p>alliances to implement and maintain mitigation measures that collectively benefit the groups in the alliance.</p> <p><b>Step 3:</b> Consider the “reasonable foreseeable future” scenarios developed for various projects during the NEPA process to determine “when” their collective cumulative impacts would be detrimental to Tribal needs and when mitigation should be implemented to be most effective.</p> <p><b>Sources of Information–Mitigation Measures:</b></p> <ul style="list-style-type: none"> <li>• Project proposal documents.</li> <li>• NEPA documents prepared for projects (proposed, past, present, and future) throughout the ExROI.</li> <li>• Online Web sites providing BMPs associated with erosion control (these BMPs are often developed to address water quality):<br/> <a href="http://www.udfcd.org/downloads/download_critmanual.htm#vol1">www.udfcd.org/downloads/download_critmanual.htm#vol1</a>;<br/> <a href="http://www.dot.state.co.us/environmental/envWaterQual/wqms4.asp">www.dot.state.co.us/environmental/envWaterQual/wqms4.asp</a>;<br/> <a href="http://www.pca.state.mn.us/water/pubs/sw-bmpmanual.html">www.pca.state.mn.us/water/pubs/sw-bmpmanual.html</a>.</li> <li>• EPA (e.g., <a href="http://www.epa.gov/ebtpages/watwaterpollutioncontrol.html">www.epa.gov/ebtpages/watwaterpollutioncontrol.html</a>) and USACE (e.g., <a href="http://www.usace.army.mil/cw/hot_topics/rglmitigation.htm">www.usace.army.mil/cw/hot_topics/rglmitigation.htm</a>) documents regarding mitigation measures.</li> </ul> <p><i>Also see Source List.</i></p> |

**Table 4. Expanded Cumulative Impact Assessment Checklist—Vegetation (Grasslands, Shrublands, Deciduous Forests, Coniferous Forests)**

| Project AOIs/ROIs  | AOC Relative to Tribal Lands  | Cumulative Impacts Across Mesabi Range ExROI  |
|--|---|---|
| <b>Characterization of the Affected Environment</b>  |   |   |
| <p><b>Step 1:</b> Obtain the following information for the project AOI/ROI:</p> <p>Definition of the AOI/ROI for vegetation. For vegetation, these areas are generally confined to the area disturbed by the proposed project (AOI) and other projects having similar impacts (ROI), respectively. In addition, a buffer that encompasses nearby plants that might be impacted by project emissions is typically included.</p> <p>Map of plant communities or land cover types. If Gap Analysis Program (GAP) data are used, note whether they have been ground truthed.</p> <p>Description of plant communities/land cover types—primary species, physiognomy, and community structure.</p> <p>Uses of plant communities/land cover types—by fish and wildlife species as habitat, and by people as sources for such items as fence posts, food (e.g., livestock, wild rice), shelter (e.g., lumber and balsam), and recreation (e.g., camping, hunting). These uses should be discussed in the vegetation section to a level of detail that explains how they relate to the vegetation, but additional information should be cross referenced in sections on such resources as fish and wildlife, culture, recreation, and socioeconomics.</p> | <p><b>Step 1:</b> Define the AOC for vegetation using logic similar to that used in defining the AOI and ROI, but expanding the AOC focal point to encompass upgradient projects that could affect (have or are affecting) plant resources of particular Tribal significance.</p> <p><b>Step 2:</b> Characterize the vegetation in the AOC as in the AOI and ROI with maps, descriptions, and local data. Add emphasis and detail regarding the Tribal significance of particular plant species and the role of vegetation in the Tribal view of the fabric of the landscape.</p> <p><b>Step 3:</b> Describe characteristics of vegetation upgradient from Tribal resources of significance, particularly if these resources might be impacted as a result of impacts to the upgradient vegetation.</p> <p><b>Step 4:</b> Address the potential for introduction of invasive species with particular care since these species impact the overall health of ecosystems and may markedly alter their natural state.</p> | <p><b>Step 1:</b> Develop GIS database to hold all data necessary to evaluate cumulative impacts of mining and other industrial facilities in the ExROI. Combine resources among Tribes to form one master GIS database that all Tribes can use.</p> <p>It may be possible to start with a copy of the GLIFWC or 1854 Treaty Authority databases and add additional information. The information to include in the GIS database includes:</p> <ul style="list-style-type: none"> <li>• General topographic information.</li> <li>• Location and extent of all historic and current mines, processing, or loading facilities and other industrial facilities in the area.</li> <li>• Location of Tribal lands, hunting grounds, wild rice-harvesting areas, Treaty access lands, cultural features, etc.</li> <li>• Plant communities or land cover types.</li> <li>• Invasive species distribution and areas where control measures are being implemented.</li> <li>• Coordinate the GIS information on plant communities/land cover types closely with information on habitat use by fish and wildlife and vegetation use by people by noting plant attributes that influence these uses, and cross referencing further detail in the</li> </ul> |

**Table 4. Expanded Cumulative Impact Assessment Checklist—Vegetation (Grasslands, Shrublands, Deciduous Forests, Coniferous Forests)**

Historic changes in plant communities/land cover types—describe how the relative acreage of various types of vegetation types differs from what it was before settlement and what are the ongoing trends in vegetation composition.

Invasive species (noxious weeds) are typically addressed specifically, since they are a detriment to ecosystem health and the development of projects often enables such species to colonize areas where they have not been previously.

**Step 2:** Determine the vegetation of interest to the Tribe in the AOI/ROI. For example, this may include particular plant species that are important to cultural uses, or expanses of undeveloped plant communities that are important because they provide fish and wildlife habitat or contribute to healthy ecosystems, or are integral components of the fabric of the landscape.

**Step 3:** Obtain any data from local, on-the-ground surveys when possible, and use them to supplement and interpret vegetation information developed from satellite imagery.

**Step 4:** Cross reference section on threatened/endangered plants where sensitive plant species are addressed.

**Step 5:** Evaluate whether documents related to the project include adequate and appropriate data on vegetation.

appropriate sections.

**Step 2:** Determine logistics of developing the GIS database, including a plan to obtain data, enter them into the system, provide system updates, and perform quality assurance to ensure that data are entered correctly.

**Step 3:** Enter available data into system; data can be entered in phases over time based on funding (see sources of information below).

**Step 4:** Determine data that are unavailable; assess which of these data are most important—location and type.

**Step 5:** Combine resources among Tribes to collect the data deemed most important.

**Sources of Information—Affected Environment:**

- Project proposal documents.
- NEPA documents and their secondary

**Sources of Information—Affected Environment:**

- Project proposal documents.
- NEPA documents and their secondary

**Sources of Information—Affected Environment:**

- Project proposal documents.
- NEPA documents and their secondary

**Table 4. Expanded Cumulative Impact Assessment Checklist—Vegetation (Grasslands, Shrublands, Deciduous Forests, Coniferous Forests)**

|   |  |  |
|---|--|--|
| <p>references on proposed project (if prepared) and on other (past, present, and future) projects affecting the same vegetation.</p> <ul style="list-style-type: none"> <li>• Tribal archives on importance of particular stands of vegetation, plant communities, or plant species.</li> <li>• GIS Data Depot: <a href="http://data.geocomm.com/">http://data.geocomm.com/</a>.</li> <li>• Minnesota GAP Data: <a href="http://www.umesc.usgs.gov/states/m/minnesota.html">www.umesc.usgs.gov/states/m/minnesota.html</a>.</li> <li>• NatureServ: <a href="http://www.natureserve.org/getData/plantData.jsp">www.natureserve.org/getData/plantData.jsp</a> (note: this site also includes information on invasive species).</li> </ul> | <p>references on proposed project (if prepared) and on other (past, present, and future) projects affecting vegetation.</p> <ul style="list-style-type: none"> <li>• Tribal archives on importance of particular stands of vegetation, plant communities, or plant species.</li> <li>• GIS Data Depot: <a href="http://data.geocomm.com/">http://data.geocomm.com/</a>.</li> <li>• Minnesota GAP Data: <a href="http://www.umesc.usgs.gov/states/m/minnesota.html">www.umesc.usgs.gov/states/m/minnesota.html</a>.</li> <li>• NatureServ: <a href="http://www.natureserve.org/getData/plantData.jsp">www.natureserve.org/getData/plantData.jsp</a> (note: this site also includes information on invasive species).</li> </ul> | <p>references on proposed past, present, and future projects affecting environmental resources throughout the ExROI, including information on AOIs, ROIs, and AOCs.</p> <ul style="list-style-type: none"> <li>• Tribal archives on importance of particular stands of vegetation, plant communities, or plant species.</li> <li>• National, statewide or local GIS databases, including such online sources as: GIS Data Depot (<a href="http://data.geocomm.com/">http://data.geocomm.com/</a>), Minnesota GAP Data (<a href="http://www.umesc.usgs.gov/states/m/minnesota.html">www.umesc.usgs.gov/states/m/minnesota.html</a>) and NatureServ (<a href="http://www.natureserve.org/getData/plantData.jsp">www.natureserve.org/getData/plantData.jsp</a>) (note: this site also includes information on invasive species).</li> <li>• MN county-specific data with digital elevation models, and orthoimagery for base maps.</li> </ul> |
| <p><i>Also see Source List.</i></p>   | <p><i>Also see Source List.</i></p>  | <p><i>Also see Source List.</i></p>  |

**Assessment of Potential Impacts**

|   |  |   |
|---|--|---|
| <p><b>Step 1:</b> Review project proposal and the literature to become familiar with potential impacts to vegetation that could occur from a project of the type proposed.</p>  | <p><b>Step 1:</b> Review NEPA documents (if any) and other reports and studies that describe mining or other projects (proposed, past, present, and future) within the AOC or sufficiently close to potentially result in impacts to AOC vegetation.</p>   | <p><b>Step 1:</b> Use the GIS to show the locations of types of developments and the AOCs identified within the ExROI.</p>  |
| <p><b>Step 2:</b> Review project description to ensure that sufficient detail is provided to enable determination of impacts on vegetation.</p>   | <p><b>Step 2:</b> Review discussions of potential or actual impacts to or from vegetation from the projects (proposed, past, present, and future) in the area. Develop a list of these impacts and supplement it with any impacts that are not included but should be. Include disruption of the fabric of the landscape (e.g., a clear-cut area in the midst of a previously unbroken forest) among the impacts considered.</p> | <p><b>Step 2:</b> Use the GIS to map data relevant to vegetation across the ExROI, filling in information for the AOCs first and then for the spaces between them when this aids in efficiency or is responsive to funding constraints. Include locations and quantitative data on locations where less common plant communities or species occur and on the extent and composition of major plant communities. Consider the vegetated landscape from viewpoints that are important in Tribal culture; use software to show what culturally significant plant communities can be seen from culturally important viewpoints. Focus the</p> |
| <p><b>Step 3:</b> Evaluate potential impacts to vegetation from the proposed project when considered alone (AOI) or with other facilities having the same impacts (ROI) including:</p> <ul style="list-style-type: none"> <li>Destruction of substantive acreages of major plant communities.</li> <li>Destruction of a high percentage of the acreage of minor plant communities.</li> <li>Degradation of plant community health by deposition of particulates or chemicals</li> </ul> | <p><b>Step 3:</b> Assess how existing vegetation upgradient</p>  |   |

**Table 4. Expanded Cumulative Impact Assessment Checklist—Vegetation (Grasslands, Shrublands, Deciduous Forests, Coniferous Forests)**

|  |   |   |
|--|---|---|
| <p>on plant surfaces and surrounding plants with poor air quality.<br/>                 Modification of the species composition of plant communities by altering ecosystem components.</p>                               | <p>(for air or water flow) or visible from the AOC would be (has been, could be, is) altered by project(s) (proposed, past, present, and future).</p>   | <p>presentation of data on information illustrating Tribal perspectives and use across the ExROI (rather than on describing the ExROI) and categorize vegetation as to its existing or sensitivity to impacts.</p>                |
| <p><b>Step 4:</b> Cross reference section on threatened/endangered species where sensitive plant species are addressed.</p>  | <p><b>Step 4:</b> Determine how far the important resources in the AOC are from vegetation that might be impacted by surrounding projects and result in secondary impacts (e.g., erosion and sedimentation) on important Tribal resources.</p>  | <p><b>Step 3:</b> Superimpose all relevant project facilities onto existing vegetation to identify locations and types of impacts that may occur where these two systems (built environment and natural environment) overlap.</p> |
|  | <p><b>Step 5:</b> Whenever possible, use quantitative data to document impacts that have occurred and to illustrate trends that support concern regarding future impacts to vegetation. For example, if disturbance of vegetation in locations X miles upstream from areas where wild rice grows has resulted in soil erosion and siltation of wild rice habitat, use this information to document the likelihood of impacts on the AOC from projects that are projected to disturb vegetation at a similar distance.</p> | <p><b>Step 4:</b> Assess whether all of these data were considered in project documents to identify impacts and conduct additional analysis to evaluate potential impacts that were not assessed in NEPA or other documents.</p>  |
|  | <p><b>Step 6:</b> Describe characteristics of vegetation upgradient from Tribal resources of significance and how these resources might be impacted if the upgradient vegetation were impacted by upgradient projects. Include information on past impacts to substantiate that similar future impacts are likely.</p>  | <p><b>Step 5:</b> Use the GIS to identify data gaps and strategic collection locations that will most cost effectively identify impacts on vegetation.</p>  |
|  | <p><b>Step 7:</b> Cross reference section on threatened/endangered species where sensitive plant species are addressed.</p>   | <p><b>Step 6:</b> Cross reference section on threatened/endangered species where sensitive plant species are addressed.</p>   |
| <p><b>Sources of Information–Potential Impacts:</b></p>  | <p><b>Sources of Information–Potential Impacts:</b></p>   | <p><b>Sources of Information–Potential Impacts:</b></p>   |
| <ul style="list-style-type: none"> <li>• Project proposal documents.</li> <li>• Reports or studies of impacts on plant communities in the AOI/ROI or the same as those that would be impacted by the proposed</li> </ul> | <ul style="list-style-type: none"> <li>• Project proposal documents.</li> <li>• NEPA or other documents prepared for projects (proposed, past, present, and future) in the AOC.</li> <li>• Reports or studies of the impacts on vegetation</li> </ul>   | <ul style="list-style-type: none"> <li>• Project proposal documents.</li> <li>• NEPA documents and their secondary references on proposed past, present, and future projects affecting vegetation throughout the</li> </ul>       |

**Table 4. Expanded Cumulative Impact Assessment Checklist—Vegetation (Grasslands, Shrublands, Deciduous Forests, Coniferous Forests)**

| <p>project in the AOI/ROI.</p> <ul style="list-style-type: none"> <li>Evaluate the impacts relative to a pre-development baseline as well as to the current baseline.</li> </ul> <p><i>Also see Source List.</i></p>   | <p>in the AOC or the same as those in the AOC.</p> <ul style="list-style-type: none"> <li>Evaluate the impacts relative to a pre-development baseline as well as relative to the current baseline.</li> </ul> <p><i>Also see Source List.</i></p>   | <p>ExROI, including information on AOIs, ROIs, and AOCs.</p> <p><i>Also see Source List.</i></p>   |
|--|---|--|
| <p><b>Development of Mitigation Measures</b></p>   |   |  |
| <p><b>Step 1:</b> Evaluate whether project documents describe measures that will mitigate potential impacts on vegetation.</p> <p><b>Step 2:</b> Review published documents regarding other, similar mining operations in the area to determine the mitigation measures used and the success of these measures (including reclamation and off-site actions) in mitigating impacts on vegetation. For impacts on vegetation, the primary types of mitigation measures available are minimizing the area of disturbance and minimizing project emissions and effluents.</p> <p><b>Step 3:</b> Assess whether mitigation measures proposed are adequate to address potential impacts.</p> | <p><b>Step 1:</b> Review NEPA and other documents and studies related to projects (proposed, past, present, and future) in the AOC to determine the mitigation measures used and the success of these measures (including reclamation and off-site actions) in mitigating impacts on vegetation. For impacts on vegetation, the primary types of mitigation measures available are minimizing the area of disturbance and minimizing project emissions and effluents.</p> <p><b>Step 2:</b> Evaluate measures that could mitigate the potential impacts identified for the AOC.</p> | <p><b>Step 1:</b> Review NEPA and other documents and studies related to projects (proposed, past, present, and future) in the ExROI to determine the mitigation measures used and the success of these measures (including reclamation and off-site actions) in mitigating impacts on vegetation. For impacts on vegetation, the primary types of mitigation measures available are minimizing the area of disturbance and minimizing project emissions and effluents.</p> <p><b>Step 2:</b> Evaluate measures that could mitigate the potential impacts identified for the ExROI; consider which of the measures identified would be most effective at the geographic scale of the ExROI.</p> <p><b>Step 3:</b> Consider the “reasonable foreseeable future” scenarios developed for various projects during the NEPA process to determine “when” their collective cumulative impacts would be detrimental to Tribal needs and when mitigation should be implemented to be most effective.</p> |

**Table 4. Expanded Cumulative Impact Assessment Checklist—Vegetation (Grasslands, Shrublands, Deciduous Forests, Coniferous Forests)**

| Sources of Information–Mitigation Measures:   | Sources of Information–Mitigation Measures:   | Sources of Information–Mitigation Measures:   |
|---|---|---|
| <ul style="list-style-type: none"> <li>Project proposal documents.</li> <li>NEPA and other documents related to this or other similar mining operations in area.</li> <li>General information regarding mitigation of impacts on vegetation.</li> </ul> <p><i>Also see Source List.</i></p> | <ul style="list-style-type: none"> <li>Project proposal documents.</li> <li>NEPA and other documents discussing mitigation of vegetation impacts from projects (proposed, past, present, and future) in the AOC.</li> <li>General information regarding mitigation of impacts on vegetation.</li> </ul> <p><i>Also see Source List.</i></p> | <ul style="list-style-type: none"> <li>Project proposal documents.</li> <li>NEPA documents and their secondary references on proposed past, present, and future projects affecting vegetation throughout the ExROI, including information on AOIs, ROIs, and AOCs.</li> </ul> <p><i>Also see Source List.</i></p> |

**Table 5. Expanded Cumulative Impact Assessment Checklist—Fish & Wildlife (Fish and Other Aquatic Species, Amphibians, Reptiles, Birds, Mammals)**

| Project AOIs/ROIs  | AOC Relative to Tribal Lands  | Cumulative Impacts Across Mesabi Range ExROI   |
|--|---|--|
| <b>Characterization of the Affected Environment</b>  |   |  |
| <p><b>Step 1:</b> Define the AOI/ROI for fish and wildlife. For these resources, both the AOI and ROI typically include the area disturbed by the proposed project when considered alone (AOI) and together with other projects having similar impacts (ROI), respectively, as well as a variable buffer. The buffer is included so that the entire home range of mobile fish and wildlife species is included for individuals that have an important part of their home range within the AOI or ROI. Thus, the size of the buffer varies depending on the mobility of the species. Widely ranging species such as bald eagles or wolves should have a large buffer while smaller species such as deer mice or boreal voles need only a narrow buffer.</p> <p><b>Step 2:</b> Obtain the following information for the project AOI/ROI:</p> <ul style="list-style-type: none"> <li>Species present in the AOI/ROI.</li> </ul> | <p><b>Step 1:</b> Define the AOC for fish and wildlife resources using logic similar to that used in defining their AOI and ROI, but expanding the AOC focal point to encompass upgradient projects that could affect selected Tribal fish and wildlife resources of particular significance.</p> <p>For fish and wildlife species, upgradient includes any distance and direction in which individual organisms associated with the AOC are likely to move and be affected by projects (proposed, past, present, and future).</p> <p><b>Step 2:</b> Characterize the fish and wildlife in the AOC as in the AOI and ROI with maps of distribution and important habitat uses, descriptions, and local data. Add emphasis and detail regarding the Tribal significance of particular animal species and the role of fish and wildlife in the Tribal view of ecosystem wholeness.</p> <p><b>Step 3:</b> Determine the fish and wildlife (e.g.,</p> | <p><b>Step 1:</b> Develop GIS database to hold all data necessary to evaluate cumulative impacts of mining and other industrial facilities in the Mesabi Range mining area ExROI. Combine resources among Tribes to form one master GIS database that all Tribes can use.</p> <p>It may be possible to start with a copy of the GLIFWC or 1854 Treaty Authority databases and add additional information. The information to include in the GIS database includes:</p> <ul style="list-style-type: none"> <li>General topographic information.</li> <li>Location and extent of all historic and current mines, processing, or loading facilities and other industrial facilities in the area.</li> <li>Location of Tribal lands, hunting grounds, wild rice-harvesting areas, Treaty access lands, cultural features,</li> </ul> |

**Table 5. Expanded Cumulative Impact Assessment Checklist—Fish & Wildlife (Fish and Other Aquatic Species, Amphibians, Reptiles, Birds, Mammals)**

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| <ul style="list-style-type: none"> <li>Habitats used by these species in aggregate and for various important components of their life cycle (e.g., critical winter range, fawning/calving areas, nesting sites, breeding ponds), which may vary seasonally.</li> </ul>   | <p>grouse, moose, and deer) resources of particular interest to the Tribe in the AOC.</p>   | <p>etc.</p>   |
| <p>Invasive species in the AOI/ROI may include animal as well as plant species. Such species are typically addressed specifically, since they are a detriment to ecosystem health and the development of projects often enables such species to colonize areas where they have not been previously.</p>  | <p><b>Step 4:</b> Cross-reference the section on threatened/endangered species for discussion of fish and wildlife species of concern.</p>  | <ul style="list-style-type: none"> <li>Invasive species distribution and areas where control measures are being implemented.</li> </ul>   |
| <p><b>Step 3:</b> Determine the fish and wildlife resources of interest to the Tribe in the AOI/ROI. For example, these may include species such as grouse, moose, and deer that have particular meaning to Tribal culture.</p>  | <p><b>Step 5:</b> Address the potential for introduction of invasive species with particular care since these species impact the overall health of ecosystems and may markedly alter their natural state.</p>   | <ul style="list-style-type: none"> <li>Fish and wildlife special use areas with individual GIS layers for each species or species group of particular interest to the Tribes or to the public at large.</li> </ul>  |
| <p><b>Step 4:</b> Cross-reference the section on threatened/endangered species for discussion of fish and wildlife species of concern.</p>   |   | <p><b>Step 2:</b> Determine logistics of developing the GIS database, including a plan to obtain data, enter them into the system, provide system updates, and perform quality assurance to ensure that data are entered correctly.</p>   |
| <p><b>Step 5:</b> Evaluate whether documents related to the project include adequate and appropriate data on fish and wildlife resources.</p>  |   | <p><b>Step 3:</b> Enter available data into system; data can be entered in phases over time based on funding (see sources of information below).</p>  |
| <p><b>Sources of Information—Affected Environment:</b></p>   | <p><b>Sources of Information—Affected Environment:</b></p>  | <p><b>Sources of Information—Affected Environment:</b></p>  |
| <ul style="list-style-type: none"> <li>Project proposal documents.</li> <li>NEPA documents and their secondary references on proposed project (if prepared) and on other (past, present, and future) projects affecting the same fish and wildlife resources.</li> <li>Tribal archives on importance of particular populations of fish and wildlife, animal communities, or animal species.</li> <li>GIS Data Depot: <a href="http://data.geocomm.com/">http://data.geocomm.com/</a>.</li> </ul> | <ul style="list-style-type: none"> <li>Project proposal documents.</li> <li>NEPA documents and their secondary references on proposed project (if prepared) and on other (past, present, and future) projects affecting fish and wildlife resources.</li> <li>Tribal archives on importance of particular populations of fish and wildlife, animal communities, or animal species.</li> <li>GIS Data Depot: <a href="http://data.geocomm.com/">http://data.geocomm.com/</a>.</li> </ul> | <ul style="list-style-type: none"> <li>Project proposal documents.</li> <li>NEPA documents and their secondary references on proposed past, present, and future projects affecting environmental resources throughout the ExROI, including information on AOIs, ROIs, and AOCs.</li> <li>Tribal archives on importance of particular populations of fish and wildlife, animal communities, or animal species</li> </ul> |

**Table 5. Expanded Cumulative Impact Assessment Checklist—Fish & Wildlife (Fish and Other Aquatic Species, Amphibians, Reptiles, Birds, Mammals)**

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| <ul style="list-style-type: none"> <li>• Minnesota GAP Data: <a href="http://www.umesc.usgs.gov/states/m/minnesota.html">www.umesc.usgs.gov/states/m/minnesota.html</a> (note: GAP data include information on the animals that characteristically inhabit the land cover types present in an area).</li> <li>• NatureServ: <a href="http://www.natureserve.org/getData/plantData.jsp">www.natureserve.org/getData/plantData.jsp</a> (note: this site also includes information on invasive species).</li> <li>• Web sites specifically about invasive species are also maintained by the Federal Highway Administration (<a href="http://FHWA">FHWA</a>) and <a href="http://USFWS">USFWS</a>.</li> </ul> <p><i>Also see Source List.</i></p> | <ul style="list-style-type: none"> <li>• Minnesota GAP Data: <a href="http://www.umesc.usgs.gov/states/m/minnesota.html">www.umesc.usgs.gov/states/m/minnesota.html</a> (note: GAP data include information on the animals that characteristically inhabit the land cover types present in an area).</li> <li>• NatureServ: <a href="http://www.natureserve.org/getData/plantData.jsp">www.natureserve.org/getData/plantData.jsp</a> (note: this site also includes information on invasive species).</li> <li>• Web sites specifically about invasive species are also maintained by the Federal Highway Administration (<a href="http://FHWA">FHWA</a>) and <a href="http://USFWS">USFWS</a>.</li> </ul> <p><i>Also see Source List.</i></p> | <ul style="list-style-type: none"> <li>• National, statewide or local GIS databases, including such online sources as: GIS Data Depot (<a href="http://data.geocomm.com/">http://data.geocomm.com/</a>), Minnesota GAP Data (<a href="http://www.umesc.usgs.gov/states/m/minnesota.html">www.umesc.usgs.gov/states/m/minnesota.html</a>) and NatureServ (<a href="http://www.natureserve.org/getData/plantData.jsp">www.natureserve.org/getData/plantData.jsp</a>) (note: this site also includes information on invasive species).</li> <li>• Web sites specifically about invasive species are also maintained by the Federal Highway Administration (<a href="http://FHWA">FHWA</a>) and <a href="http://USFWS">USFWS</a>.</li> <li>• MN county-specific data with digital elevation models, and orthoimagery for base maps</li> </ul> <p><i>Also see Source List.</i></p> |
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**Assessment of Potential Impacts**

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| <p><b>Step 1:</b> Review project proposal and the literature to become familiar with potential impacts to fish and wildlife that could occur from a project of the type proposed.</p> <p><b>Step 2:</b> Review project description to ensure that sufficient detail is provided to enable determination of impacts on fish and wildlife.</p> <p><b>Step 3:</b> Evaluate potential impacts to fish and wildlife from the proposed project when considered alone (AOI) or with other facilities having the same impacts (ROI) including:<br/>                 Death of individual organisms through roadkill and other means.<br/>                 Ripple effects up the food chain from destruction of forage or death of individual organisms in prey species.<br/>                 Destruction of substantive acreages of habitat for major fish and wildlife</p> | <p><b>Step 1:</b> Review NEPA documents (if any) and other reports and studies that describe mining or other projects (proposed, past, present, and future) within the AOC or sufficiently close to potentially result in impacts to fish and wildlife resources in the AOC.</p> <p><b>Step 2:</b> Review discussions of potential or actual impacts on fish and wildlife resources from the projects (proposed, past, present, and future) in the AOC. Develop a list of these impacts and supplement it with any impacts that are not included but should be. Include habitat fragmentation (e.g., clear-cut area or road in the midst of a previously unbroken forest) among the impacts considered.</p> <p><b>Step 3:</b> Assess how existing fish and wildlife resources that use the AOC as well as surrounding areas would be (have been, could be, are) altered by project(s) (proposed, past, present, and future).</p> | <p><b>Step 1:</b> Use the GIS to show locations of types of developments and the AOCs identified within the ExROI.</p> <p><b>Step 2:</b> Use the GIS to map data relevant to fish and wildlife resources across the ExROI, filling in information for the AOCs first and then for the spaces between them when this aids in efficiency or is responsive to funding constraints. Include locations and quantitative data on locations where less common animal communities or species occur and on the extent and composition of major animal populations. Illustrate special use areas for individual animal species of particular public or Tribal interest, and show migration pathways as well. Focus the presentation of data on information illustrating Tribal perspectives and use across the ExROI (rather than on describing the ExROI) and categorize fish and wildlife resources as to their existing or sensitivity</p> |
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**Table 5. Expanded Cumulative Impact Assessment Checklist—Fish & Wildlife (Fish and Other Aquatic Species, Amphibians, Reptiles, Birds, Mammals)**

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| populations.  | Consider impacts on individuals that use the AOC for part of their life cycle but range outside it at times.   | to impacts.   |
| Destruction of a high percentage of the acreage of habitats for minor fish and wildlife populations.  | <b>Step 4:</b> Determine how far impacts to fish and wildlife resources might be from the AOC but still impact it (e.g., loss of a deer population outside the AOC might cause wolves to prey more heavily on deer within the AOC), thereby resulting in indirect impacts on important Tribal resources.   | <b>Step 3:</b> Superimpose all relevant project facilities onto existing fish and wildlife resource data to identify locations and types of impacts that may occur where these two systems (built environment and natural environment) or their influences overlap. |
| Degradation of fish and wildlife community health by deposition of particulates or chemicals on soil and plant surfaces and surrounding plants and animals with poor air quality.   | <b>Step 5:</b> Whenever possible, use quantitative data to document impacts that have occurred and to illustrate trends that support concern regarding future impacts to fish and wildlife resources. For example, if disturbance of fish and wildlife prey populations X miles from an area has resulted in documented indirect impacts to that area because of shifts in patterns of predation, use this information to document the likelihood of similar impacts on the AOC from projects that are projected to disturb fish and wildlife resources at a similar distance. | <b>Step 4:</b> Assess whether all of these data were considered in project documents to identify impacts and conduct additional analysis to evaluate potential impacts that were not assessed in NEPA or other documents.   |
| Evaluate the potential for bio-uptake and bioaccumulation of chemicals that may have greater impact at higher food chain levels.  | <b>Step 6:</b> Cross reference section on threatened/endangered species where sensitive animal species are addressed.  | <b>Step 5:</b> Use the GIS to identify data gaps and strategic collection locations that will most cost effectively identify impacts on fish and wildlife resources.  |
| Modification of the species composition of animal communities by altering ecosystem components.   |  | <b>Step 6:</b> Cross reference section on threatened/endangered species where sensitive animal species are addressed.   |
| Interruption of migratory pathways or increased mortality because traditional migratory pathways have become unsafe.  |  |   |
| Interruption of key life cycle activities such as breeding or successful rearing of young by disturbance that prevents completion of breeding cycles or causes mortality of offspring because young are left untended, or supporting habitat is eliminated. |  |   |
| Increased mortality of fish and wildlife because of increased human and predator access to areas that previously did not have ready ingress.  |  |   |
| Fragmentation of habitat so that it becomes less than optimal or unusable by species requiring large expanses of unbroken habitat.  |  |   |
| <b>Step 4:</b> Cross reference section on threatened/endangered species where   |  |   |

**Table 5. Expanded Cumulative Impact Assessment Checklist—Fish & Wildlife (Fish and Other Aquatic Species, Amphibians, Reptiles, Birds, Mammals)**

sensitive animal species are addressed.

| <b>Sources of Information–Potential Impacts:</b>  | <b>Sources of Information–Potential Impacts:</b>  | <b>Sources of Information–Potential Impacts:</b>   |
|---|---|--|
| <ul style="list-style-type: none"> <li>• Project proposal documents.</li> <li>• Reports or studies of impacts on animal populations and communities in the AOI/ROI or the same as those that would be impacted by the proposed project in the AOI/ROI.</li> <li>• Evaluate the impacts relative to a pre-development baseline as well as relative to the current baseline.</li> </ul> <p><i>Also see Source List.</i></p> | <ul style="list-style-type: none"> <li>• Project proposal documents.</li> <li>• NEPA or other documents prepared for projects (proposed, past, present, and future) in the AOC.</li> <li>• Reports or studies of the impacts on animal populations and communities in the AOC or the same as those in the AOC.</li> <li>• Evaluate the impacts relative to a pre-development baseline as well as relative to the current baseline.</li> </ul> <p><i>Also see Source List.</i></p> | <ul style="list-style-type: none"> <li>• Project proposal documents.</li> <li>• NEPA documents and their secondary references on proposed past, present, and future projects affecting fish and wildlife resources throughout the ExROI, including information on AOIs, ROIs, and AOCs.</li> <li>• Assessing impacts across the entire ExROI would be a substantive benefit to understanding impacts to wide ranging species and their special use habitats because it would provide a detailed context within which individual project impacts could be evaluated.</li> </ul> <p><i>Also see Source List.</i></p> |

**Development of Mitigation Measures**

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| <p><b>Step 1:</b> Evaluate whether project documents describe measures that will mitigate potential impacts on fish and wildlife resources.</p>  | <p><b>Step 1:</b> Review published documents regarding other, similar mining operations in the area to determine the mitigation measures used and the success of these measures (including reclamation and off-site actions) in mitigating impacts on fish and wildlife resources. For impacts on fish and wildlife, the primary types of mitigation measures available are avoidance or minimization of individual deaths and disturbance of key life cycle activities (e.g., successful breeding and overwintering), minimization of ripple effects within food chains, and minimization of project emissions and effluents.</p> | <p><b>Step 1:</b> Review NEPA and other documents and studies related to projects (proposed, past, present, and future) in the ExROI to determine the mitigation measures used and the success of these measures (including reclamation and off-site actions) in mitigating impacts on fish and wildlife resources. For impacts on fish and wildlife, the primary types of mitigation measures available are avoidance or minimization of individual deaths and disturbance of key life cycle activities (e.g., successful breeding and overwintering), minimization of ripple effects within food chains, and minimization of project emissions and effluents.</p> |
| <p><b>Step 2:</b> Review published documents regarding other, similar mining operations in the area to determine the mitigation measures used and the success of these measures (including reclamation and off-site actions) in mitigating impacts on fish and wildlife resources. For impacts on fish and wildlife, the primary types of mitigation measures available are avoidance or minimization of individual deaths and disturbance of key life cycle activities (e.g., successful breeding and overwintering), minimization of ripple effects within food chains, and minimization of project emissions and effluents.</p> | <p><b>Step 2:</b> Evaluate measures that could mitigate the potential impacts identified for the AOC.</p>  | <p><b>Step 2:</b> Evaluate measures that could mitigate the potential impacts identified for the ExROI; consider which of the measures identified</p>   |

**Table 5. Expanded Cumulative Impact Assessment Checklist—Fish & Wildlife (Fish and Other Aquatic Species, Amphibians, Reptiles, Birds, Mammals)**

**Step 3:** Assess whether mitigation measures proposed are adequate to address potential impacts.

would be most effective at the geographic scale of the ExROI.

**Step 3:** Consider the “reasonable foreseeable future” scenarios developed for various projects during the NEPA process to determine “when” their collective cumulative impacts would be detrimental to Tribal needs and when mitigation should be implemented to be most effective.

**Sources of Information–Mitigation Measures:**

- Project proposal documents.
- NEPA and other documents related to this or other similar mining operations in area.
- General information regarding mitigation of impacts on fish and wildlife resources.

*Also see Source List.*

**Sources of Information–Mitigation Measures:**

- Project proposal documents.
- NEPA and other documents discussing mitigation of vegetation impacts from projects (proposed, past, present, and future) in the AOC.
- General information regarding mitigation of impacts on fish and wildlife resources.

*Also see Source List.*

**Sources of Information–Mitigation Measures:**

- Project proposal documents.
- NEPA documents and their secondary references on proposed past, present, and future projects affecting fish and wildlife resources throughout the ExROI, including information on AOIs, ROIs, and AOCs.

*Also see Source List.*

| <b>Table 6. Expanded Cumulative Impact Assessment Checklist—Threatened/Endangered Species (Plants, Animals)</b>  |  |  |
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| Project AOIs/ROIs  | AOC Relative to Tribal Lands   | Cumulative Impacts Across Mesabi Range ExROI   |
| Characterization of the Affected Environment   |  |  |
| <p><b>Step 1:</b> Characterization of the AOI/ROI affected environment for threatened/endangered plant and animal species is performed as described for more common species (see Tables 4 and 5).</p> <p><b>Step 2:</b> In addition, because populations of threatened/endangered species are in jeopardy, they must be characterized in great detail and their presence or absence in the AOI/ROI specifically determined. Concern for these species focuses on protection of individual organisms rather than on populations, which are the focal point for more common species.</p> <p>Typically field studies using approved USFWS or state wildlife agency protocols must be conducted when projects are proposed within suitable habitat. In addition, critical habitat is designated for some threatened/endangered species and it must be characterized to the same degree as the species themselves.</p> <p>Informal consultation with the USFWS must be initiated, a list of threatened/endangered species in the area requested, and a determination made as to whether formal consultation under Section 7 of the Endangered Species Act is required. Formal consultation and preparation of a Biological Assessment (BA) are required if it is determined that the project is likely to adversely affect a threatened/endangered species. Formal consultation has specific requirements:</p> <p style="padding-left: 40px;">Completion of BA within 180 days of list receipt and verification of list</p> | <p><b>Step 1:</b> Characterization of the AOC affected environment for threatened/endangered plant and animal species is performed as described for more common species (see Tables 4 and 5).</p> <ul style="list-style-type: none"> <li>• <b>Step 2:</b> In addition, because populations of threatened/endangered species are in jeopardy, they must be characterized in great detail and their presence or absence in the AOC specifically determined. Concern for these species focuses on protection of individual organisms rather than on populations, which are the focal point for more common species.</li> <li>• Typically field studies using approved USFWS or state wildlife agency protocols must be conducted when projects are proposed within suitable habitat. In addition, critical habitat is designated for some threatened/endangered species and it must be characterized to the same degree as the species themselves.</li> </ul> <p>Informal consultation with the USFWS must be initiated, a list of threatened/endangered species in the area requested, and a determination made as to whether formal consultation under Section 7 of the Endangered Species Act is required. Formal consultation and preparation of a BA are required if it is determined that the project is likely to adversely affect a threatened/endangered species. Formal consultation has specific requirements:</p> <p style="padding-left: 40px;">Completion of BA within 180 days of list receipt and verification of list accuracy if BA is not started within</p> | <p><b>Step 1:</b> Characterization of the ExROI affected environment for threatened/endangered plant and animal species is performed as described for more common species (see Tables 4 and 5).</p> <ul style="list-style-type: none"> <li>• <b>Step 2:</b> In addition, because populations of threatened/endangered species are in jeopardy, they must be characterized in great detail and their presence or absence in the ExROI specifically determined. Concern for these species focuses on protection of individual organisms rather than on populations, which are the focal point for more common species.</li> <li>• Typically field studies using approved USFWS or state wildlife agency protocols must be conducted when projects are proposed within suitable habitat. In addition, critical habitat is designated for some threatened/endangered species and it must be characterized to the same degree as the species themselves.</li> </ul> <p>Informal consultation with the USFWS must be initiated, a list of threatened/endangered species in the area requested, and a determination made as to whether formal consultation under Section 7 of the Endangered Species Act is required. Formal consultation and preparation of a BA are required if it is determined that the project is likely to adversely affect a threatened/endangered species. Formal consultation has specific requirements:</p> <p style="padding-left: 40px;">Completion of BA within 180 days of list receipt and verification of list accuracy if BA is not started within</p> |

| <b>Table 6. Expanded Cumulative Impact Assessment Checklist—Threatened/Endangered Species (Plants, Animals)</b>   |   |   |
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| <p>accuracy if BA is not started within 90 days of list receipt.</p> <p>USFWS completion of the BA review and issuance of a Biological Opinion (BO) within 135 days after receipt of the package initiating formal consultation.</p> <p>Receipt of the BO before the Final EIS is published so that the BO can be addressed in the Record of Decision (ROD).</p>  | <p>90 days of list receipt.</p> <p>USFWS completion of the BA review and issuance of a BO within 135 days after receipt of the package initiating formal consultation.</p> <p>Receipt of the BO before the Final EIS is published so that the BO can be addressed in the ROD.</p> <ul style="list-style-type: none"> <li>• If the AOC includes lands owned by the Tribes, the same care should be taken in characterizing any threatened/endangered species and designated critical habitat, although the legal requirements for so doing may vary by species.</li> </ul>   | <p>90 days of list receipt.</p> <p>USFWS completion of the BA review and issuance of a BO within 135 days after receipt of the package initiating formal consultation.</p> <p>Receipt of the BO before the Final EIS is published so that the BO can be addressed in the ROD.</p> <ul style="list-style-type: none"> <li>• If the ExROI includes lands owned by the Tribes, the same care should be taken in characterizing any threatened/endangered species and designated critical habitat, although the legal requirements for so doing may vary by species.</li> </ul>   |
| <p><b>Sources of Information—Affected Environment:</b></p> <ul style="list-style-type: none"> <li>• The same sources of information used to characterize more common plant and animal species in the AOI/ROI affected environment should also provide information on threatened/endangered species.</li> <li>• In addition, information on Federally-listed threatened/endangered species can be found at <a href="http://ecos.fws.gov/tess_public/StateListing.do?status=listed&amp;state=MN">http://ecos.fws.gov/tess_public/StateListing.do?status=listed&amp;state=MN</a> and information on state-listed species can be found at <a href="http://www.dnr.state.mn.us/ets/index.html">www.dnr.state.mn.us/ets/index.html</a>, which also provides links to the Federal site.</li> <li>• Finally, when informal consultation is initiated with the USFWS, that agency will provide a list of threatened/endangered species that are of concern in the area and, if formal consultation is required, that agency will continue to be an important source of specific, often local, information on threatened/endangered species.</li> </ul> <p><i>Also see Source List.</i></p> | <p><b>Sources of Information—Affected Environment:</b></p> <ul style="list-style-type: none"> <li>• The same sources of information used to characterize more common plant and animal species in the AOC affected environment should also provide information on threatened/endangered species.</li> <li>• In addition, information on Federally-listed threatened/endangered species can be found at <a href="http://ecos.fws.gov/tess_public/StateListing.do?status=listed&amp;state=MN">http://ecos.fws.gov/tess_public/StateListing.do?status=listed&amp;state=MN</a> and information on state-listed species can be found at <a href="http://www.dnr.state.mn.us/ets/index.html">www.dnr.state.mn.us/ets/index.html</a>, which also provides links to the Federal site.</li> <li>• Finally, when informal consultation is initiated with the USFWS, that agency will provide a list of threatened/endangered species that are of concern in the area and, if formal consultation is required, that agency will continue to be an important source of specific, often local, information on threatened/endangered species.</li> </ul> <p><i>Also see Source List.</i></p> | <p><b>Sources of Information—Affected Environment:</b></p> <ul style="list-style-type: none"> <li>• The same sources of information used to characterize more common plant and animal species in the ExROI affected environment should also provide information on threatened/endangered species.</li> <li>• In addition, information on Federally-listed threatened/endangered species can be found at <a href="http://ecos.fws.gov/tess_public/StateListing.do?status=listed&amp;state=MN">http://ecos.fws.gov/tess_public/StateListing.do?status=listed&amp;state=MN</a> and information on state-listed species can be found at <a href="http://www.dnr.state.mn.us/ets/index.html">www.dnr.state.mn.us/ets/index.html</a>, which also provides links to the Federal site.</li> <li>• Finally, when informal consultation is initiated with the USFWS, that agency will provide a list of threatened/endangered species that are of concern in the area and, if formal consultation is required, that agency will continue to be an important source of specific, often local, information on threatened/endangered species.</li> <li>• MN County specific data with digital elevation models, and orthoimagery for base maps.</li> </ul> <p><i>Also see Source List.</i></p> |

| <b>Table 6. Expanded Cumulative Impact Assessment Checklist—Threatened/Endangered Species (Plants, Animals)</b>   |  |  |
|---|--|--|
| <b>Assessment of Potential Impacts</b>  |  |  |
| <p><b>Step 1:</b> The assessment of potential impacts to threatened/endangered species in the AOI/ROI is performed in the same way as the assessment of impacts to more common plant and animal species.</p> <p><b>Step 2:</b> In addition, the following factors must be considered:</p> <ul style="list-style-type: none"> <li>Impacts on individual organisms of these species.</li> <li>Impacts on designated critical habitat present in the AOI/ROI.</li> <li>Detailed attention to impacts on threatened/endangered species and designated critical habitat in the BA. The decision to initiate formal consultation with USFWS rests on the likelihood that a project will adversely affect (impact) a threatened/endangered species. Therefore, a key component of the BA is an assessment of impacts.</li> </ul> | <p><b>Step 1:</b> The assessment of potential impacts to threatened/endangered species in the AOC is performed in the same way as the assessment of impacts to more common plant and animal species.</p> <p><b>Step 2:</b> In addition, the following factors must be considered:</p> <ul style="list-style-type: none"> <li>Impacts on individual organisms of these species.</li> <li>Impacts on designated critical habitat present in the AOI/ROI.</li> <li>Detailed attention to impacts on threatened/endangered species and designated critical habitat in the BA. The decision to initiate formal consultation with USFWS rests on the likelihood that a project will adversely affect (impact) a threatened/endangered species. Therefore, a key component of the BA is an assessment of impacts.</li> <li>If the AOC includes lands owned by the Tribes, the same care should be taken in characterizing impacts to any threatened/endangered species and designated critical habitat, although the legal requirements for so doing may vary by species.</li> <li>Since many Tribal relationships with natural resources relate to their presence in healthy, diverse, and complete ecosystems, the Federal/state protection of threatened/endangered species may benefit Tribal interests. Conversely, protection of these species may constrain some traditional uses that were developed at a time when these species were much more abundant.</li> </ul> | <p><b>Step 1:</b> The assessment of potential impacts to threatened/endangered species in the ExROI is performed in the same way as the assessment of impacts to more common plant and animal species.</p> <p><b>Step 2:</b> In addition, the following factors must be considered:</p> <ul style="list-style-type: none"> <li>Impacts on individual organisms of these species.</li> <li>Impacts on designated critical habitat present in the AOI/ROI.</li> <li>Detailed attention to impacts on threatened/endangered species and designated critical habitat in the BA. The decision to initiate formal consultation with USFWS rests on the likelihood that a project will adversely affect (impact) a threatened/endangered species. Therefore, a key component of the BA is an assessment of impacts.</li> <li>If the ExROI includes lands owned by the Tribes, the same care should be taken in characterizing impacts to any threatened/endangered species and designated critical habitat, although the legal requirements for so doing may vary by species.</li> <li>Since many Tribal relationships with natural resources relate to their presence in healthy, diverse, and complete ecosystems, the Federal/state protection of threatened/endangered species may benefit Tribal interests. Conversely, protection of these species may constrain some traditional uses that were developed at a time when these species were much more abundant.</li> </ul> |

| <b>Table 6. Expanded Cumulative Impact Assessment Checklist—Threatened/Endangered Species (Plants, Animals)</b>  |  |  |
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| <p><b>Sources of Information–Potential Impacts:</b></p> <ul style="list-style-type: none"> <li>• The same sources of information used to assess impacts to more common plant and animal species in the AOI/ROI should also provide information on impacts to threatened/endangered species.</li> <li>• In addition, if formal consultation is required because a project is likely to adversely affect (impact) threatened/endangered species or designated critical habitat, USFWS will be an ongoing partner in providing information on impacts and critiquing the adequacy of impacts identified in the BA.</li> </ul> <p><i>Also see Source List.</i></p>                                 | <p><b>Sources of Information–Potential Impacts:</b></p> <ul style="list-style-type: none"> <li>• The same sources of information used to assess impacts to more common plant and animal species in the AOC should also provide information on impacts to threatened/endangered species.</li> <li>• In addition, if formal consultation is required because a project is likely to adversely affect (impact) threatened/endangered species or designated critical habitat, USFWS will be an ongoing partner in providing information on impacts and critiquing the adequacy of impacts identified in the BA.</li> </ul> <p><i>Also see Source List.</i></p>                             | <p><b>Sources of Information–Potential Impacts:</b></p> <ul style="list-style-type: none"> <li>• The same sources of information used to assess impacts to more common plant and animal species in the ExROI should also provide information on impacts to threatened/endangered species.</li> <li>• In addition, if formal consultation is required because a project is likely to adversely affect (impact) threatened/endangered species or designated critical habitat, USFWS will be an ongoing partner in providing information on impacts and critiquing the adequacy of impacts identified in the BA.</li> <li>• Preparation of a BA that addresses the entire ExROI would be a substantive benefit to understanding impacts to threatened/endangered species and designated critical habitat because it would provide a detailed context within which individual project impacts could be evaluated.</li> </ul> <p><i>Also see Source List.</i></p> |
| <b>Development of Mitigation Measures</b>  |  |  |
| <p><b>Step 1:</b> The development of mitigation measures for potential impacts to threatened/endangered species and critical habitat in the AOI/ROI is performed in the same way as the development of mitigation measures for more common plant and animal species.</p> <p><b>Step 2:</b> In addition, the following factors must be considered:</p> <ul style="list-style-type: none"> <li>Mitigation of impacts on individual organisms of these species.</li> <li>Mitigation of impacts on designated critical habitat present in the AOI/ROI.</li> <li>Thorough attention to mitigation of impacts on threatened/endangered species and designated critical habitat in the BA.</li> </ul> | <p><b>Step 1:</b> The development of mitigation measures for potential impacts to threatened/endangered species and critical habitat in the AOC is performed in the same way as the development of mitigation measures for more common plant and animal species.</p> <p><b>Step 2:</b> In addition, the following factors must be considered:</p> <ul style="list-style-type: none"> <li>Mitigation of impacts on individual organisms of these species.</li> <li>Mitigation of impacts on designated critical habitat present in the AOC.</li> <li>Thorough attention to mitigation of impacts on threatened/endangered species and designated critical habitat in the BA.</li> </ul> | <p><b>Step 1:</b> The development of mitigation measures for potential impacts to threatened/endangered species and critical habitat in the ExROI is performed in the same way as the development of mitigation measures for more common plant and animal species.</p> <p><b>Step 2:</b> In addition, the following factors must be considered:</p> <ul style="list-style-type: none"> <li>Mitigation of impacts on individual organisms of these species.</li> <li>Mitigation of impacts on designated critical habitat present in the ExROI.</li> <li>Thorough attention to mitigation of impacts on threatened/endangered species and designated critical habitat in the BA.</li> </ul>   |

| <b>Table 6. Expanded Cumulative Impact Assessment Checklist—Threatened/Endangered Species (Plants, Animals)</b>  |  |   |
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| <p>Once accepted by USFWS and incorporated into the ROD for a project, these mitigation measures will become a legally required component of the project.</p>  | <p>Once accepted by USFWS and incorporated into the ROD for a project, these mitigation measures will become a legally required component of the project.</p> <p>If the AOC includes lands owned by the Tribes, the same care should be taken in mitigating impacts to any threatened/endangered species and designated critical habitat, although the legal requirements for so doing may vary by species.</p> <p>Since many Tribal relationships with natural resources relate to their presence in healthy, diverse, and complete ecosystems, the Federal/state protection of threatened/endangered species may benefit Tribal interests. Conversely, protection of these species may constrain some traditional uses that were developed at a time when these species were much more abundant.</p> | <p>Once accepted by USFWS and incorporated into the ROD for a project, these mitigation measures will become a legally required component of the project.</p> <p>If the ExROI includes lands owned by the Tribes, the same care should be taken in mitigating impacts to any threatened/endangered species and designated critical habitat, although the legal requirements for so doing may vary by species.</p> <p>Since many Tribal relationships with natural resources relate to their presence in healthy, diverse, and complete ecosystems, the Federal/state protection of threatened/endangered species may benefit Tribal interests. Conversely, protection of these species may constrain some traditional uses that were developed at a time when these species were much more abundant.</p>          |
| <p><b>Sources of Information—Mitigation Measures:</b></p> <ul style="list-style-type: none"> <li>• The same sources of information used to identify mitigation measures for impacts to more common plant and animal species in the AOI/ROI should also provide information on impacts to threatened/endangered species.</li> <li>• In addition, if formal consultation is required because a project is likely to adversely affect (impact) threatened/endangered species or designated critical habitat, the USFWS will be an ongoing partner in providing information on acceptable measures to mitigate impacts and critiquing the adequacy of the mitigation measures identified in the BA.</li> </ul> <p><i>Also see Source List.</i></p> | <p><b>Sources of Information—Mitigation Measures:</b></p> <ul style="list-style-type: none"> <li>• The same sources of information used to identify mitigation measures for impacts to more common plant and animal species in the AOC should also provide information on impacts to threatened/endangered species.</li> <li>• In addition, if formal consultation is required because a project is likely to adversely affect (impact) threatened/endangered species or designated critical habitat, the USFWS will be an ongoing partner in providing information on acceptable measures to mitigate impacts and critiquing the adequacy of the mitigation measures identified in the BA.</li> </ul> <p><i>Also see Source List.</i></p>   | <p><b>Sources of Information—Mitigation Measures:</b></p> <ul style="list-style-type: none"> <li>• The same sources of information used to identify mitigation measures for impacts to more common plant and animal species in the ExROI should also provide information on impacts to threatened/endangered species.</li> <li>• In addition, if formal consultation is required because a project is likely to adversely affect (impact) threatened/endangered species or designated critical habitat, the USFWS will be an ongoing partner in providing information on acceptable measures to mitigate impacts and critiquing the adequacy of the mitigation measures identified in the BA.</li> <li>• Preparation of a BA that identifies measures for the entire ExROI would substantively benefit</li> </ul> |

| <b>Table 6. Expanded Cumulative Impact Assessment Checklist—Threatened/Endangered Species (Plants, Animals)</b> |  |   |
|---|--|---|
|   |  | <p>the mitigation of impacts to threatened/endangered species and designated critical habitat because it would provide a detailed context within which the effectiveness and appropriateness of individual project mitigation measures could be evaluated. This is particularly true for wide ranging species where larger scale development of mitigation measures could ensure an adequate supply of critical use areas (e.g., nesting sites, critical winter range) and habitat features that are in sufficiently short supply to limit populations.</p> <p><i>Also see Source List.</i></p> |

| Table 7. Expanded Cumulative Impact Assessment Checklist—Cultural Resources (Archeology, Historic Properties, Traditional Cultural Properties and Uses)   |   |  |
|---|---|--|
| Project AOIs/ROIs   | AOC Relative to Tribal Lands  | Cumulative Impacts Across Mesabi Range ExROI   |
| <b>Characterization of the Affected Environment</b>   |   |  |
| <p><b>Step 1:</b> Define the AOI/ROI for cultural resources. For these resources, both the AOI and ROI typically include the area disturbed by the proposed project when considered alone (AOI) and together with other projects having similar impacts (ROI), respectively. This area is generally sufficient when archeological resources and historic properties are considered. However, when traditional cultural properties and uses are considered, a variable buffer must be added. Since many of the traditional cultural properties and uses are closely tied to ecosystem components and especially involve fish and wildlife species that tend to have the largest AOI/ROI areas, the AOI/ROI for cultural resources should initially be considered equal to the AOI/ROI for fish and wildlife. Areas outside this boundary should then be evaluated to see if they contained any traditional properties and use areas that should also be encompassed within the cultural resource buffer. Conversely, whether a smaller area would encompass the cultural resources associated with the AOI or ROI should also be considered.</p> <p><b>Step 2:</b> For the AOI/ROI established for cultural resources:</p> <ul style="list-style-type: none"> <li>• Provide a pre-historic and historic context for the AOI/ROI, briefly summarizing the people who lived in the area and information on their way of life, particularly as it relates to</li> </ul> | <p><b>Step 1:</b> Define the AOC for cultural resources using logic similar to that used in defining their AOI and ROI, but expanding the AOC focal point to encompass projects that could affect selected Tribal lands of significance. The AOC is by definition associated with cultural resources, which may be based on environmental components already discussed, and/or on anthropological events of Tribal history.</p> <p><b>Step 2:</b> Collect and document information on the AOC as for the AOI/ROI, except in this case, the entire AOC can be presented as a culturally significant area. The need to disclose what specific resources within the AOC are important and even why they are important is largely dependant on the extent of Tribal control over the land within the AOC boundary. The less Tribal control, the greater the need may be to justify Tribal significance to others who control the land.</p> <ul style="list-style-type: none"> <li>• As noted for the AOI/ROI, it may be possible to identify <u>what</u> is significant to the Tribes without revealing <u>why</u> it is important (and thereby revealing aspects of these resources that may be sacred to the Tribes).</li> <li>• For cultural resources that cannot be associated with known resources, determine how they can be identified and characterized sufficiently to determine impacts to them.</li> </ul> <p><b>Step 3:</b> Cross-reference information on other resources where this will aid in indirectly</p> | <p><b>Step 1:</b> Develop GIS database to hold all data necessary to evaluate cumulative impacts of mining and other industrial facilities in the Mesabi Range mining area ExROI. Combine resources among Tribes to form one master GIS database that all Tribes can use.</p> <p>It may be possible to start with a copy of the GLIFWC or 1854 Treaty Authority databases and add additional information. The information to include in the GIS database includes:</p> <ul style="list-style-type: none"> <li>• General topographic information.</li> <li>• Location and extent of all historic and current mines, processing, or loading facilities and other industrial facilities in the area.</li> <li>• Location of Tribal lands, hunting grounds, wild rice-harvesting areas, Treaty access lands, cultural features, etc.</li> <li>• Information on all natural resources that provide a specific foundation for cultural importance to the Tribes.</li> <li>• Information on archeological and historic resources is typically not included on GIS layers because making such information public exposes these sites to plundering.</li> <li>• Similarly, information on traditional cultural properties and uses is typically not included on GIS layers because</li> </ul> |

| Table 7. Expanded Cumulative Impact Assessment Checklist—Cultural Resources (Archeology, Historic Properties, Traditional Cultural Properties and Uses)   |   |  |
|---|---|--|
| <p>artifacts that may have been found and resources that may still be present and culturally significant.</p> <ul style="list-style-type: none"> <li>• Identify archeological and historic resources that have been recorded by previous cultural resource surveys.</li> <li>• Conduct a Class I, II, or III survey of the area that the proposed project would disturb according to a plan developed in coordination with the State Historic Preservation Officer (SHPO) and/or Tribal Historic Preservation Officer (THPO), as appropriate to the area.</li> <li>• Broadly characterize the archeological and historic resources previously recorded or newly identified during area surveys, but keep details of these data in confidential records with the SHPO/THPO.</li> <li>• Whenever possible and appropriate, identify traditional cultural properties or uses by associating them with known resources, which may often be ecological, archeological, or historic. This may make it possible to identify <u>what</u> is significant to the Tribes without revealing <u>why</u> it is important (and thereby revealing aspects of these resources that may be sacred to the Tribes).</li> </ul> <p><b>Step 3:</b> Determine how cultural resources that cannot be associated with known resources can be sufficiently identified and characterized to enable determination of impacts to them.</p> <p><b>Step 4:</b> Cross reference sections on other resources</p> | <p>characterizing AOC cultural resources of importance.</p> | <p>making such information public exposes these sites to desecration.</p> <ul style="list-style-type: none"> <li>• It may be possible to group cultural resource areas into broad categories (e.g., unlikely to contain cultural resources...likely to contain cultural resources) and to make their geographic representations sufficiently large that little information is revealed. Associating cultural resource categories with the need for “no, minor, or extensive permitting procedures” rather than the presence of resources might identify areas of importance without revealing the reason for their importance.</li> </ul> <p><b>Step 2:</b> Determine logistics of developing the GIS database, including a plan to obtain data, enter them into the system, provide system updates, and perform quality assurance to ensure that data are entered correctly.</p> <p><b>Step 3:</b> Enter available data into system; data can be entered in phases over time based on funding (see sources of information below).</p> <p><b>Step 4:</b> Determine data that are unavailable; assess which of these data are most important—location and type.</p> <p><b>Step 5:</b> Combine resources among Tribes to collect the data deemed most important.</p> <p><b>Step 6:</b> Determine how cultural resource data should be handled so that it can be visualized by decision makers without compromising the sacred aspects of its significance to the Tribes or revealing the specific locations of data kept by the SHPO/THPO.</p> |

| Table 7. Expanded Cumulative Impact Assessment Checklist—Cultural Resources (Archeology, Historic Properties, Traditional Cultural Properties and Uses)   |  |  |
|---|--|--|
| <p>where this will aid in indirectly characterizing cultural resources of importance.</p> <p><b>Step 5:</b> Evaluate whether documents related to the project include adequate and appropriate data on cultural resources, including the cultural value of other resources (e.g., natural setting, plants, fish and wildlife).</p>  |  |  |
| <p><b>Sources of Information–Affected Environment:</b></p> <ul style="list-style-type: none"> <li>• Project proposal documents.</li> <li>• Reports or studies of cultural resources within or near the AOI/ROI.</li> <li>• In addition to these secondary sources of information on archeologic and historic resources, there are several primary sources: Federal records, particularly on historic resources, are maintained by the NPS and can be found online at: <a href="http://www.cr.nps.gov/">www.cr.nps.gov/</a>. State records on archeological and historic resources are maintained by the Minnesota State Historic Preservation Office, which can be contacted through information found at: <a href="http://www.mnhs.org/shpo/">www.mnhs.org/shpo/</a>. This office may also have some information on cultural properties and uses. Only selected information will be released to the public by the SHPO/THPO. Tribal records, to the extent they can appropriately be made public, contain the most reliable source of information on cultural properties and cultural uses.</li> </ul> <p><i>Also see Source List.</i></p> | <p><b>Sources of Information–Affected Environment:</b></p> <ul style="list-style-type: none"> <li>• Sources of information for the AOC are the same as for the AOI/ROI. Because the AOC is defined by cultural properties and cultural uses that are significant to the Tribes, Tribal records should be the primary source of information on the AOC. Nonetheless, other sources of information such as the SHPO/THPO and secondary sources should be used to make the information complete.</li> </ul> <p><i>Also see Source List.</i></p> | <p><b>Sources of Information–Affected Environment:</b></p> <ul style="list-style-type: none"> <li>• Little graphical information on cultural resources is made publicly available. However, being able to visualize the locations of all cultural resources on a GIS map would be extremely helpful in planning an overall strategy to minimize impacts to these resources.</li> <li>• Maintaining strict access controls on a database that contains specific information on cultural properties and uses would be a good approach to making useful information available only to appropriate people.</li> <li>• Close and trusted coordination between the SHPO/THPO and Tribal elders, the keepers of the most detailed information on cultural resources, should be developed to enable sharing of their information.</li> <li>• For more public uses, it may be possible to group cultural resource areas into broad categories and make their geographic representations sufficiently large that little information is revealed, as mentioned above. Associating cultural resource categories with the need for “no, minor, or extensive permitting procedures” rather than the presence of resources might identify areas of importance without revealing the reason for their importance.</li> </ul> <p><i>Also see Source List.</i></p> |

| Table 7. Expanded Cumulative Impact Assessment Checklist—Cultural Resources (Archeology, Historic Properties, Traditional Cultural Properties and Uses)  |   |   |
|--|---|---|
| Assessment of Potential Impacts  |   |   |
| <p><b>Step 1:</b> Review project proposal and the literature to become familiar with potential impacts to cultural resources that could occur from a project of the type proposed.</p> <p><b>Step 2:</b> Review project description to ensure that sufficient detail is provided to enable determination of impacts on cultural resources.</p> <p><b>Step 3:</b> Evaluate potential impacts to cultural resources from the proposed project when considered alone (AOI) or with other facilities having the same impacts (ROI) including:</p> <ul style="list-style-type: none"> <li>Destruction of (archeological or historic) cultural resources by project activities, especially if there is no plan to capture information about these resources before they are lost.</li> <li>Desecration of traditional cultural properties, use areas, or resources so that their meaning or sacredness is compromised (e.g., by diminished water quality or chemically contaminated meat).</li> <li>Destruction or desecration of the fabric of the landscape surrounding and supporting cultural resources so that their meaning or sacredness is compromised even if the resources themselves are untouched.</li> <li>Removal of cultural resources from their natural setting so that their meaning or sacredness are compromised.</li> </ul> <p><b>Step 4:</b> Cross reference sections on impacts to other resources that are of cultural significance (e.g., vegetation, fish and wildlife).</p> | <p><b>Step 1:</b> Review NEPA documents (if any) and other reports and studies that describe mining or other projects (proposed, past, present, and future) within the AOC or sufficiently close to potentially result in impacts to AOC cultural resources.</p> <p><b>Step 2:</b> Review discussions of potential or actual impacts on cultural resources from the projects (proposed, past, present, and future) in the AOC. Develop a list of these impacts and supplement it with any impacts that are not included but should be. Include disturbance to the fabric of the landscape that supports cultural resources among the impacts considered.</p> <p><b>Step 3:</b> Assess how existing cultural resources that use the AOC as well as surrounding areas would be (have been, could be, are) altered by project(s) (proposed, past, present, and future).</p> <p><b>Step 4:</b> Determine how far impacts to cultural or other resources might be from the AOC and still indirectly impact cultural resources within the AOC that are important to the Tribes.</p> <p><b>Step 5:</b> Whenever possible, use quantitative data to document impacts that have occurred and to illustrate trends that support concern regarding future impacts to cultural resources. For example, if diminished water quality X miles from an area where wild rice grows has resulted in documented indirect impacts to that species, use this information to document the likelihood of similar impacts on the AOC from projects that are projected to disturb water quality (and hence the growth of wild rice—a</p> | <p><b>Step 1:</b> Use the GIS to show locations of types of developments and the AOCs identified within the ExROI.</p> <p><b>Step 2:</b> Use the GIS to map data relevant to cultural resources across the ExROI, filling in information for the AOCs first and then for the spaces between them when this aids in efficiency or is responsive to funding constraints.</p> <p><b>Step 3:</b> Superimpose all relevant project facilities onto existing cultural resource data to identify locations and types of impacts that may occur where these two systems (built environment and natural environment) or their influences overlap.</p> <p><b>Step 4:</b> As noted in discussing documentation of cultural resources in the affected environment, maps of cultural resources are not made public, which means that GIS layers of specific cultural resources are not created or their access is carefully guarded. When mapping cultural resources, it may be possible to map surrogate information or map the resource as an unidentified component of more complex information. For example, if pipestone deposits are culturally significant, perhaps these deposits can be mapped among various soil types, or a particular soil type that contains pipestone can be mapped instead of the pipestone deposits.</p> <p>Focus the presentation of data on information illustrating Tribal perspectives and use across the ExROI (rather than on describing the ExROI) and categorize various areas as to their existing or sensitivity to cultural resource impacts.</p> |

| Table 7. Expanded Cumulative Impact Assessment Checklist—Cultural Resources (Archeology, Historic Properties, Traditional Cultural Properties and Uses)  |  |   |
|--|--|---|
|  | <p>cultural resource) at a similar distance.</p> <p><b>Step 6:</b> Cross reference sections on impacts to other resources that are of cultural significance (e.g., vegetation, fish and wildlife).</p>   | <p><b>Step 4:</b> Assess whether all of these data were considered in project documents to identify impacts and conduct additional analysis to evaluate potential impacts that were not assessed in NEPA or other documents.</p> <p><b>Step 5:</b> Use the GIS to identify data gaps and strategic collection locations that will most cost effectively identify impacts on cultural resources.</p> <p><b>Step 6:</b> Cross reference sections on impacts to other resources that are of cultural significance (e.g., vegetation, fish and wildlife).</p>   |
| <p><b>Sources of Information–Potential Impacts:</b></p> <ul style="list-style-type: none"> <li>• Project proposal documents.</li> <li>• Reports or studies of impacts on cultural resources in the AOI/ROI or the same as those that would be impacted by the proposed project in the AOI/ROI.</li> <li>• Evaluate the impacts relative to a pre-development baseline as well as to the current baseline.</li> </ul> <p><i>Also see Source List.</i></p> | <p><b>Sources of Information–Potential Impacts:</b></p> <ul style="list-style-type: none"> <li>• Project proposal documents.</li> <li>• NEPA or other documents prepared for projects (proposed, past, present, and future) in the AOC.</li> <li>• Reports or studies of the impacts on archeological resources, historic resources, traditional cultural properties or uses in the AOI or the same as those in the AOC.</li> <li>• Evaluate the impacts relative to a pre-development baseline as well as to the current baseline.</li> </ul> <p><i>Also see Source List.</i></p> | <p><b>Sources of Information–Potential Impacts:</b></p> <ul style="list-style-type: none"> <li>• Project proposal documents.</li> <li>• NEPA documents and their secondary references on proposed past, present, and future projects affecting cultural resources throughout the ExROI, including information on AOIs, ROIs, and AOCs.</li> <li>• Assessing impacts across the entire ExROI would be a substantive benefit to understanding impacts to widespread cultural resources because it would provide a detailed context within which individual project impacts could be evaluated.</li> </ul> <p><i>Also see Source List.</i></p> |
| Development of Mitigation Measures   |  |   |
| <p><b>Step 1:</b> Evaluate whether project documents describe measures that will mitigate potential impacts on cultural resources.</p> <p><b>Step 2:</b> Review published documents regarding other, similar mining operations in the area to determine the mitigation measures used and the success of these measures (including reclamation and off-site actions) in mitigating impacts on cultural resources.</p>                                     | <p><b>Step 1:</b> Review published documents regarding other, similar mining operations in the area to determine the mitigation measures used and the success of these measures (including reclamation and off-site actions) in mitigating impacts on cultural resources. For impacts on cultural resources, the primary types of mitigation measures available are avoidance or minimization of disturbance to cultural resources, or the</p>   | <p><b>Step 1:</b> Review published documents regarding other, similar mining operations in the area to determine the mitigation measures used and the success of these measures (including reclamation and off-site actions) in mitigating impacts on cultural resources. For impacts on cultural resources, the primary types of mitigation measures available are avoidance or minimization of disturbance to cultural resources, or the</p>  |

| Table 7. Expanded Cumulative Impact Assessment Checklist—Cultural Resources (Archeology, Historic Properties, Traditional Cultural Properties and Uses)   |  |   |
|---|--|---|
| <p>For impacts on cultural resources, the primary types of mitigation measures available are avoidance or minimization of disturbance to cultural resources, or the collection of data on a resource before it is moved from its natural setting.</p> <p><b>Step 3:</b> Assess whether mitigation measures proposed are adequate to address potential impacts.</p>  | <p>collection of data on a resource before it is moved from its natural setting.</p> <p><b>Step 2:</b> Evaluate measures that could mitigate the potential impacts identified for the AOC.</p>   | <p>collection of data on a resource before it is moved from its natural setting.</p> <p><b>Step 2:</b> Evaluate measures that could mitigate the potential impacts identified for the ExROI; consider which of the measures identified would be most effective at the geographic scale of the ExROI.</p> <p><b>Step 3:</b> Consider the “reasonable foreseeable future” scenarios developed for various projects during the NEPA process to determine “when” their collective cumulative impacts would be detrimental to Tribal needs and when mitigation should be implemented to be most effective.</p> |
| <p><b>Sources of Information–Mitigation Measures:</b></p> <ul style="list-style-type: none"> <li>• Project proposal documents.</li> <li>• NEPA and other documents related to this or other similar mining operations in area.</li> <li>• General information regarding mitigation of impacts on cultural resources.</li> </ul> <p><i>Also see Source List.</i></p> | <p><b>Sources of Information–Mitigation Measures:</b></p> <ul style="list-style-type: none"> <li>• Project proposal documents.</li> <li>• NEPA and other documents discussing mitigation of impacts to cultural resources from projects (proposed, past, present, and future) in the AOC.</li> <li>• General information regarding mitigation of impacts on natural setting, vegetation, fish and wildlife, visual, and other cultural resources.</li> </ul> <p><i>Also see Source List.</i></p> | <p><b>Sources of Information–Mitigation Measures:</b></p> <ul style="list-style-type: none"> <li>• Project proposal documents.</li> <li>• NEPA documents and their secondary references on proposed past, present, and future projects affecting cultural resources throughout the ExROI, including information on AOIs, ROIs, and AOCs.</li> </ul> <p><i>Also see Source List.</i></p>   |

| Table 8. Expanded Cumulative Impact Assessment Checklist—Land Use (Specialized Uses [e.g., farmlands, sugarbushes, balsam gathering lands], Ownership Patterns, Treaty Lands and Their Uses)  |   |   |
|---|---|---|
| Project AOIs/ROIs   | AOC Relative to Tribal Lands  | Cumulative Impacts Across Mesabi Range ExROI  |
| <b>Characterization of the Affected Environment</b>   |   |   |
| <p><b>Step 1:</b> Define the AOI/ROI for consideration of land use. For this resource, both the AOI and ROI typically include the area disturbed by the proposed project when considered alone (AOI) and together with other projects having similar impacts (ROI), respectively.</p> <p><b>Step 2:</b> For the AOI/ROI established for land use: Describe the various land uses (characterize how they are defined, what subcategories of land use are included, and their relative acreages) throughout each area.</p> <p>Discuss historical trends in land use changes and how and the degree to which the proposed project would change land use relative to its pre-development baseline and its current baseline.</p> <p>Map these land uses.</p> <p>Describe the patterns of land use and the degree to which adjacent or nearby land uses are compatible.</p> <p><b>Step 3:</b> Cross-reference sections on other resources where this will aid in characterizing important land uses (e.g., areas where wild rice is harvested might be mentioned during consideration of wetlands, vegetation, cultural resources, and/or land use).</p> <p><b>Step 5:</b> Evaluate whether documents related to the project include adequate and appropriate data on land use.</p> | <p><b>Step 1:</b> Define the AOC for land use using logic similar to that used in defining its AOI and ROI, but in addition:</p> <p>Expand the AOC focal point to encompass projects that could affect selected Tribal lands of significance.</p> <p>Identify and emphasize areas where treaty rights exist, noting their ownership, ease of access, and potential jeopardy to exercise of treaty rights.</p> <p><b>Step 2:</b> Collect and document information on the AOC as for the AOI/ROI.</p> <p><b>Step 3:</b> Cross-reference information on other resources where this will aid in indirectly characterizing AOC land use of importance.</p> | <p><b>Step 1:</b> Develop GIS database to hold all data necessary to evaluate cumulative impacts of mining and other industrial facilities in the Mesabi Range mining area ExROI. Combine resources among Tribes to form one master GIS database that all Tribes can use.</p> <p>It may be possible to start with a copy of the GLIFWC or 1854 Treaty Authority databases and add additional information.</p> <p>The information to include in the GIS database includes:</p> <p>General topographic information.</p> <p>Location and extent of all historic and current mines, processing, or loading facilities and other industrial facilities in the area.</p> <p>General land use throughout the ExROI. Map land use at a scale that will enable later analysis of conflicts among incompatible land uses.</p> <p>Location of Tribal land uses—hunting grounds, wild rice-harvesting areas, Treaty access lands, cultural features, etc.</p> <p>Map and characterize areas where treaty rights exist, noting their ownership, ease of access, and potential jeopardy to exercise of treaty rights. Color code areas according to these attributes so that areas in jeopardy will be readily apparent.</p> <p>Information on all natural resources that</p> |

| <b>Table 8. Expanded Cumulative Impact Assessment Checklist—Land Use (Specialized Uses [e.g., farmlands, sugarbushes, balsam gathering lands], Ownership Patterns, Treaty Lands and Their Uses)</b>  |  |  |
|--|--|--|
|  |  | <p>provide a specific foundation for land use of importance to the Tribes.</p> <p><b>Step 2:</b> Determine logistics of developing the GIS database, including a plan to obtain data, enter them into the system, provide system updates, and perform quality assurance to ensure that data are entered correctly.</p> <p><b>Step 3:</b> Enter available data into system; data can be entered in phases over time based on funding (see sources of information below).</p> <p><b>Step 4:</b> Determine data that are unavailable; assess which of these data are most important—location and type.</p> <p><b>Step 5:</b> Combine resources among Tribes to collect the data deemed most important.</p>          |
| <p><b>Sources of Information—Affected Environment:</b></p> <ul style="list-style-type: none"> <li>• Project proposal documents.</li> <li>• Reports or studies of land use within or near the AOI/ROI.</li> <li>• In addition to these secondary sources of information on land use, there are several primary sources:<br/>Minnesota Department of Natural Resources: <a href="http://www.dnr.state.mn.us/sitemap/index.html">www.dnr.state.mn.us/sitemap/index.html</a>, county-specific data on multiple media including land use: <a href="http://data.geocomm.com/catalog/US/61055/42/index.html">http://data.geocomm.com/catalog/US/61055/42/index.html</a>.</li> </ul> <p><i>Also see Source List.</i></p> | <p><b>Sources of Information—Affected Environment:</b></p> <ul style="list-style-type: none"> <li>• Project proposal documents.</li> <li>• Reports or studies of land use within or near the AOI/ROI.</li> <li>• In addition to these secondary sources of information on land use, there are several primary sources:<br/>Minnesota Department of Natural Resources: <a href="http://www.dnr.state.mn.us/sitemap/index.html">www.dnr.state.mn.us/sitemap/index.html</a>, county-specific data on multiple media including land use: <a href="http://data.geocomm.com/catalog/US/61055/42/index.html">http://data.geocomm.com/catalog/US/61055/42/index.html</a>.</li> </ul> <p><i>Also see Source List.</i></p> | <p><b>Sources of Information—Affected Environment:</b></p> <ul style="list-style-type: none"> <li>• Project proposal documents.</li> <li>• Reports or studies of land use within or near the AOI/ROI.</li> <li>• In addition to these secondary sources of information on land use, there are several primary sources:<br/>Minnesota Department of Natural Resources: <a href="http://www.dnr.state.mn.us/sitemap/index.html">www.dnr.state.mn.us/sitemap/index.html</a>, county-specific data on multiple media including land use: <a href="http://data.geocomm.com/catalog/US/61055/42/index.html">http://data.geocomm.com/catalog/US/61055/42/index.html</a>.</li> </ul> <p><i>Also see Source List.</i></p> |
| <b>Assessment of Potential Impacts</b>   |  |  |
| <p><b>Step 1:</b> Review project proposal and the literature to become familiar with potential impacts to land uses that could occur from a project of the type proposed.</p> <p><b>Step 2:</b> Review project description to ensure that</p>  | <p><b>Step 1:</b> Review NEPA documents (if any) and other reports and studies that describe mining or other projects (proposed, past, present, and future) within the AOC or sufficiently close to potentially result in</p>  | <p><b>Step 1:</b> Use the GIS to show locations of types of developments and the AOCs identified within the ExROI.</p> <p><b>Step 2:</b> Use the GIS to map data relevant to land use across the ExROI, filling in information</p>   |

| <b>Table 8. Expanded Cumulative Impact Assessment Checklist—Land Use (Specialized Uses [e.g., farmlands, sugarbushes, balsam gathering lands], Ownership Patterns, Treaty Lands and Their Uses)</b>  |  |   |
|--|--|---|
| <p>sufficient detail is provided to enable determination of impacts on land uses and what indirect impacts from land use changes might occur.</p> <p><b>Step 3:</b> Evaluate potential impacts to land use from the proposed project when considered alone (AOI) or with other facilities having the same impacts (ROI) including:</p> <p>Altered land use within the AOI and similarly altered land use within the ROI.</p> <p>Secondary impacts on land use that occur when AOI land uses are no longer compatible with surrounding land uses that change as a result.</p> <p>Changes in the fabric of the landscape as a result of land use modification (e.g., altered land uses, changes in relative abundance of various land uses relative to pre-development and current baselines).</p> <p>Changes in land use fueled by short term economic gain that cause a long-term loss in important resources (e.g., conversion of fertile farm lands to housing developments, or loss of woodlots that cause a paucity of nesting sites to limit populations).</p> <p><b>Step 4:</b> Cross reference sections on impacts to other resources (e.g., vegetation, fish and wildlife) that support land uses that are of particular importance.</p> | <p>impacts to AOC land uses.</p> <p><b>Step 2:</b> Review discussions of potential or actual impacts on land use from the projects (proposed, past, present, and future) in the AOC. Develop a list of these impacts and supplement it with any impacts that are not included but should be. Include disturbance to the fabric of the landscape where compatible land uses are adjacent among the impacts considered.</p> <p><b>Step 3:</b> Assess how existing land use in the AOC as well as in surrounding areas would be (has been, could be, is) altered by project(s) (proposed, past, present, and future).</p> <p><b>Step 4:</b> Determine how far impacts to land use and other associated resources could be from the AOC and still indirectly impact land uses within the AOC that are important to the Tribes.</p> <p><b>Step 5:</b> Whenever possible, use quantitative data to document impacts that have occurred and to illustrate trends that support concern regarding future impacts to land use. For example, if changes in land use X miles from an area where moose are abundant have resulted in documented indirect impacts to that species, use this information to document the likelihood of similar impacts on the AOC from projects that are projected to disturb land use at a similar distance.</p> <p><b>Step 6:</b> Cross reference sections on impacts to other resources that are interrelated with the significance of particular land uses (e.g., vegetation, fish and wildlife).</p> | <p>for the AOCs first and then for the spaces between them when this aids in efficiency or is responsive to funding constraints.</p> <p><b>Step 3:</b> Superimpose all relevant project facilities onto existing land use data to identify locations and types of impacts that may occur where these two systems (built environment and natural environment) or their influences overlap. Discuss both direct and indirect impacts on land use as land use changes associated with mining and other development result in changes to ExROI ecosystems.</p> <p><b>Step 4:</b> Assess whether all of these data were considered in project documents to identify impacts and conduct additional analysis to evaluate potential impacts that were not assessed in NEPA or other documents.</p> <p><b>Step 5:</b> Use the GIS to identify data gaps and strategic collection locations that will most cost effectively identify impacts on land use.</p> <p><b>Step 6:</b> Cross reference sections on impacts to other resources that are supported by particular land uses (e.g., vegetation, fish and wildlife).</p> |
| <p><b>Sources of Information–Potential Impacts:</b></p> <ul style="list-style-type: none"> <li>• Project proposal documents.</li> </ul>  | <p><b>Sources of Information–Potential Impacts:</b></p> <ul style="list-style-type: none"> <li>• Project proposal documents.</li> </ul>  | <p><b>Sources of Information–Potential Impacts:</b></p> <ul style="list-style-type: none"> <li>• Project proposal documents.</li> </ul>   |

| <b>Table 8. Expanded Cumulative Impact Assessment Checklist—Land Use (Specialized Uses [e.g., farmlands, sugarbushes, balsam gathering lands], Ownership Patterns, Treaty Lands and Their Uses)</b>   |  |  |
|---|--|--|
| <ul style="list-style-type: none"> <li>• Reports or studies of impacts on land use in the AOI/ROI or the same as those that would be impacted by the proposed project in the AOI/ROI.</li> <li>• Evaluate the impacts relative to a pre-development baseline as well as to the current baseline.</li> </ul> <p><i>Also see Source List.</i></p>   | <ul style="list-style-type: none"> <li>• NEPA or other documents prepared for projects (proposed, past, present, and future) in the AOC.</li> <li>• Reports or studies of the impacts on land use in the AOC or the same as those in the AOC.</li> <li>• Evaluate AOC impacts relative to a pre-development baseline as well as to the current baseline.</li> </ul> <p><i>Also see Source List.</i></p>  | <ul style="list-style-type: none"> <li>• NEPA documents and their secondary references on proposed past, present, and future projects affecting land use throughout the ExROI, including information on AOIs, ROIs, and AOCs.</li> <li>• Assessing impacts on land use across the entire ExROI would be a substantive benefit to understanding impacts to widespread land use patterns because it would provide a detailed context within which individual project impacts could be evaluated.</li> </ul> <p><i>Also see Source List.</i></p>  |
| <b>Development of Mitigation Measures</b>   |  |  |
| <p><b>Step 1:</b> Evaluate whether project documents describe measures that will mitigate potential impacts on land uses.</p> <p><b>Step 2:</b> Review published documents regarding other, similar mining operations in the area to determine the mitigation measures used and the success of these measures (including reclamation and off-site actions) in mitigating impacts on land use. For impacts on land use, the primary types of mitigation measures available are avoidance or minimization of disturbance to some types of surrounding incompatible land uses by developing visual and/or sound barriers.</p> <p><b>Step 3:</b> Assess whether mitigation measures proposed are adequate to address potential impacts.</p> | <p><b>Step 1:</b> Review published documents regarding other, similar mining operations in the area to determine the mitigation measures used and the success of these measures (including reclamation and off-site actions) in mitigating impacts on land use. For impacts on land use, the primary types of mitigation measures available are avoidance or minimization of disturbance to some types of surrounding incompatible land uses by developing visual and/or sound barriers.</p> <p><b>Step 2:</b> Evaluate measures that could mitigate the potential impacts identified for the AOC.</p> | <p><b>Step 1:</b> Review published documents regarding other, similar mining operations in the area to determine the mitigation measures used and the success of these measures (including reclamation and off-site actions) in mitigating impacts on land use. For impacts on land use, the primary types of mitigation measures available are avoidance or minimization of disturbance to some types of surrounding incompatible land uses by developing visual and/or sound barriers.</p> <p><b>Step 2:</b> Evaluate measures that could mitigate the potential impacts identified for the ExROI; consider which of the measures identified would be most effective at the geographic scale of the ExROI. Developing and implementing land use plans at the geographic scale of the ExROI would be particularly effective in avoiding changes in the fabric of the landscape and in maintaining an adequate and dispersed supply of key resources (e.g., prime farmlands, healthy ecosystems, special fish and wildlife seasonal use areas, water bodies where wild rice grows—all of which</p> |

| <b>Table 8. Expanded Cumulative Impact Assessment Checklist—Land Use (Specialized Uses [e.g., farmlands, sugarbushes, balsam gathering lands], Ownership Patterns, Treaty Lands and Their Uses)</b>   |  |   |
|---|--|---|
|   |  | <p>are dependent on a particular framework or pattern of land uses).</p> <p><b>Step 3:</b> Consider the “reasonable foreseeable future” scenarios developed for various projects during the NEPA process to determine “when” their collective cumulative impacts would be detrimental to Tribal needs and when mitigation should be implemented to be most effective.</p>     |
| <p><b>Sources of Information–Mitigation Measures:</b></p> <ul style="list-style-type: none"> <li>• Project proposal documents.</li> <li>• NEPA and other documents related to this or other similar mining operations in area.</li> <li>• General information regarding mitigation of impacts on land use.</li> </ul> <p><i>Also see Source List.</i></p> | <p><b>Sources of Information–Mitigation Measures:</b></p> <ul style="list-style-type: none"> <li>• Project proposal documents.</li> <li>• NEPA and other documents discussing mitigation of impacts to land use from projects (proposed, past, present, and future) in the AOC.</li> <li>• General information regarding mitigation of impacts on land use.</li> </ul> <p><i>Also see Source List.</i></p> | <p><b>Sources of Information–Mitigation Measures:</b></p> <ul style="list-style-type: none"> <li>• Project proposal documents.</li> <li>• NEPA documents and their secondary references on proposed past, present, and future projects affecting land use throughout the ExROI, including information on AOIs, ROIs, and AOCs.</li> </ul> <p><i>Also see Source List.</i></p> |

**Table 9. Expanded Cumulative Impact Assessment Checklist—Socioeconomics (Infrastructure, Population, Housing, Services, Employment, Economy, Environmental Justice, Noise, Aesthetics)**

| Project AOIs/ROIs   | AOC Relative to Tribal Lands  | Cumulative Impacts Across Mesabi Range ExROI  |
|---|---|---|
| <b>Characterization of the Affected Environment</b>   |   |   |
| <p><b>Step 1:</b> Define the AOI/ROI for socioeconomics. For this resource, both the AOI and ROI typically include more than the area disturbed by the proposed project when considered alone (AOI) and together with other projects having similar impacts (ROI), respectively. This area is generally surrounded by a buffer that varies in size with the socioeconomic component being considered.</p> <p>Two factors influence the size of the buffer for each component:</p> <p>The extent to which project impacts extend beyond the AOI/ROI for the component, since the affected environment must be characterized across the entire area that may be impacted.</p> <p>The geographic area for which data are available to characterize the affected environment.</p> <p>For example:</p> <p>A project that employs a great number of people will influence population, housing, secondary employment, and services in an area that extends considerably beyond the AOI. The AOI should include a buffer that encompasses these influences. In addition, data on the baseline population, housing, and employment will be provided by census tracts; data</p> | <p><b>Step 1:</b> Define the AOC for socioeconomic resources using logic similar to that used in defining their AOI and ROI, but expanding the AOC focal point to encompass projects that could affect selected Tribal lands of significance.</p> <p><b>Step 2:</b> Collect and document socioeconomic information on the AOC as for the AOI/ROI. In characterizing the AOC for socioeconomics, include information on Tribal as well as non-Tribal infrastructure, population, housing, services, employment, economy, environmental justice parameters, noise and aesthetics. These data are needed even though the AOC may be defined on the basis of natural resources.</p> <p><b>Step 3:</b> Cross-reference information on other resources where this will aid in indirectly characterizing AOC cultural resources of importance.</p> | <p><b>Step 1:</b> Develop GIS database to hold all data necessary to evaluate cumulative impacts of mining and other industrial facilities in the Mesabi Range mining area ExROI. Combine resources among Tribes to form one master GIS database that all Tribes can use.</p> <p>It may be possible to start with a copy of the GLIFWC or 1854 Treaty Authority databases and add additional information. The information to include in the GIS database includes:</p> <p>General topographic information.</p> <p>Location of transportation network, transmission lines, pipelines, etc.</p> <p>Location and extent of all historic and current mines, processing, or loading facilities and other industrial facilities in the area.</p> <p>Location of Tribal lands, hunting grounds, wild rice-harvesting areas, Treaty access lands, cultural features, etc.</p> <p>Coordinated socioeconomics and land use data.</p> <p>Noise contour lines for past, current, or proposed projects, included on a single layer so that their collective distribution across the ExROI can be seen.</p> <p>Locations of aesthetic resources and important viewpoints. Use</p> |

**Table 9. Expanded Cumulative Impact Assessment Checklist—Socioeconomics (Infrastructure, Population, Housing, Services, Employment, Economy, Environmental Justice, Noise, Aesthetics)**

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|--|---|
| <p>on schools will be constrained by school district boundaries; data on fire protection services will be constrained by fire protection district boundaries, etc.</p>   | <p>software to determine and illustrate the viewsheds associated with individual viewpoints.</p>  |
| <p>Similarly, characterization of the environmental justice baseline will be based on census data.</p>   | <p>Mapped census tract, census block group, and census block boundaries within the ExROI.</p>   |
| <p>The AOI/ROI for noise will be determined in part by the type of noise, volume of noise, and timing of noise produced by a project as well as by the noise environment of the project setting and the presence of topography or facilities that may baffle the noise.</p>                | <p><b>Step 2:</b> Determine logistics of developing the GIS database, including a plan to obtain data, enter them into the system, provide system updates, and perform quality assurance to ensure that data are entered correctly.</p>     |
| <p>The AOI/ROI buffer for aesthetics should include viewpoints and their viewsheds that encompass areas visible from within the primary AOI/ROI and from which the primary AOI/ROI can be seen. The importance of viewpoints increases as the number of people who use them increases.</p> | <p><b>Step 3:</b> Enter available data into system; data can be entered in phases over time based on funding (see sources of information below).</p>  |
| <p><b>Step 2:</b> For the AOI/ROI established for socioeconomics:</p>  | <p><b>Step 4:</b> Compare the types of data available from the U.S. Census Bureau and from Tribal governments, and strive to make these types of data as consistent as possible so that all populations can be characterized similarly.</p> |
| <p>Describe the infrastructure supporting the AOI/ROI community—major roads, railroads, airports, etc.</p>   | <p><b>Step 5:</b> Determine data that are unavailable; assess which of these data are most important—location and type.</p>   |
| <p>Characterize the population (e.g., age, ethnicity, income, housing, employment).</p>  | <p><b>Step 6:</b> Combine resources among Tribes to collect the data deemed most important.</p>   |
| <p>Characterize the economy (types of employers, their relative importance and monetary contribution to the AOI/ROI). Describe how these businesses influence the AOI/ROI by using local supplies or how supplies</p>  |   |

**Table 9. Expanded Cumulative Impact Assessment Checklist—Socioeconomics (Infrastructure, Population, Housing, Services, Employment, Economy, Environmental Justice, Noise, Aesthetics)**

from outside the AOI/ROI are brought into the area.

Describe the school system, social services, fire protection, police protection, and other services, addressing how extensive these services are and whether they are at capacity.

Describe the current noise environment of the AOI/ROI in terms of dBA and note what the maximum noise levels are, when they occur, and where they are relative to sensitive receptors.

Identify and describe aesthetic resources in the natural or built environment that contribute to the beauty of the AOI/ROI community, contribute to its sense of place, and are enjoyed by its residents.

**Step 3:** Cross-reference sections on other resources where this will aid in indirectly characterizing socioeconomic resources of importance.

**Step 4:** Evaluate whether documents related to the project include adequate and appropriate data on socioeconomic resources.

**Sources of Information—Affected Environment:**

- Project proposal documents.
- Reports or studies of socioeconomic resources within or near the AOI/ROI.
- In addition to these secondary sources of information on socioeconomic resources, there are several primary sources:
  - U.S. Census Bureau Question and Answer Center: [https://ask.census.gov/cgi-bin/askcensus.cfg/php/enduser/std\\_alp.php?p\\_search\\_text=FactFinder](https://ask.census.gov/cgi-bin/askcensus.cfg/php/enduser/std_alp.php?p_search_text=FactFinder).

**Sources of Information—Affected Environment:**

- Project proposal documents.
- Reports or studies of socioeconomic resources within or near the AOI/ROI.
- In addition to these secondary sources of information on socioeconomic resources, there are several primary sources:
  - U.S. Census Bureau Question and Answer Center: [https://ask.census.gov/cgi-bin/askcensus.cfg/php/enduser/std\\_alp.php?p\\_search\\_text=FactFinder](https://ask.census.gov/cgi-bin/askcensus.cfg/php/enduser/std_alp.php?p_search_text=FactFinder).

**Sources of Information—Affected Environment:**

- Project proposal documents.
- Reports or studies of socioeconomic resources within or near the AOI/ROI.
- In addition to these secondary sources of information on socioeconomic resources, there are several primary sources:
  - U.S. Census Bureau Question and Answer Center: [https://ask.census.gov/cgi-bin/askcensus.cfg/php/enduser/std\\_alp.php?p\\_search\\_text=FactFinder](https://ask.census.gov/cgi-bin/askcensus.cfg/php/enduser/std_alp.php?p_search_text=FactFinder).

**Table 9. Expanded Cumulative Impact Assessment Checklist—Socioeconomics (Infrastructure, Population, Housing, Services, Employment, Economy, Environmental Justice, Noise, Aesthetics)**

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|---|---|---|
| <ul style="list-style-type: none"> <li>U.S. Census Bureau Download Center: <a href="http://factfinder.census.gov/servlet/DownloadDatasetServlet?lang=en">http://factfinder.census.gov/servlet/DownloadDatasetServlet?lang=en</a>.</li> <li>U.S. Census Bureau Decennial Data Description: <a href="http://factfinder.census.gov/servlet/DatasetMainPageServlet?program=DEC&amp;submenuId=&amp;lang=en&amp;ts=">http://factfinder.census.gov/servlet/DatasetMainPageServlet?program=DEC&amp;submenuId=&amp;lang=en&amp;ts=</a>.</li> <li>Contact local Planning Departments, Chambers of Commerce and Tribal government for additional local data.</li> <li>For most projects, the above sources of data, which can be obtained free, will be sufficient. It is possible to purchase datasets tailored to unique boundaries when necessary.</li> </ul> <p><i>Also see Source List.</i></p> | <ul style="list-style-type: none"> <li>U.S. Census Bureau Download Center: <a href="http://factfinder.census.gov/servlet/DownloadDatasetServlet?lang=en">http://factfinder.census.gov/servlet/DownloadDatasetServlet?lang=en</a>.</li> <li>U.S. Census Bureau Decennial Data Description: <a href="http://factfinder.census.gov/servlet/DatasetMainPageServlet?program=DEC&amp;submenuId=&amp;lang=en&amp;ts=">http://factfinder.census.gov/servlet/DatasetMainPageServlet?program=DEC&amp;submenuId=&amp;lang=en&amp;ts=</a>.</li> <li>Contact local Planning Departments, Chambers of Commerce and Tribal government for additional local data.</li> <li>For most projects, the above sources of data, which can be obtained free, will be sufficient. It is possible to purchase datasets tailored to unique boundaries when necessary.</li> </ul> <p><i>Also see Source List.</i></p> | <ul style="list-style-type: none"> <li>U.S. Census Bureau Download Center: <a href="http://factfinder.census.gov/servlet/DownloadDatasetServlet?lang=en">http://factfinder.census.gov/servlet/DownloadDatasetServlet?lang=en</a>.</li> <li>U.S. Census Bureau Decennial Data Description: <a href="http://factfinder.census.gov/servlet/DatasetMainPageServlet?program=DEC&amp;submenuId=&amp;lang=en&amp;ts=">http://factfinder.census.gov/servlet/DatasetMainPageServlet?program=DEC&amp;submenuId=&amp;lang=en&amp;ts=</a>.</li> <li>Contact local Planning Departments, Chambers of Commerce and Tribal government for additional local data.</li> <li>For most projects, the above sources of data, which can be obtained free, will be sufficient. It is possible to purchase datasets tailored to unique boundaries when necessary.</li> </ul> <p><i>Also see Source List.</i></p> |
|---|---|---|

**Assessment of Potential Impacts**

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|--|--|---|
| <p><b>Step 1:</b> Review project proposal and the literature to become familiar with potential impacts to socioeconomic resources that could occur from a project of the type proposed.</p> <p><b>Step 2:</b> Review project description to ensure that sufficient detail is provided to enable determination of impacts on socioeconomic resources.</p> <p><b>Step 3:</b> Evaluate potential impacts to socioeconomic resources from the proposed project when considered alone (AOI) or with other facilities having the same impacts (ROI) including:<br/>                 Note whether the proposed project (alone or cumulatively with other projects) will affect the economy of the AOI/ROI.<br/>                 Determine whether population, housing, infrastructure, services, or</p> | <p><b>Step 1:</b> Review NEPA documents (if any) and other reports and studies that describe mining or other projects (proposed, past, present, and future) within the AOC or sufficiently close to potentially result in impacts to AOC socioeconomic resources.</p> <p><b>Step 2:</b> Review discussions of potential or actual impacts on socioeconomic resources from the projects (proposed, past, present, and future) in the AOC. Develop a list of these impacts and supplement it with any impacts that are not included but should be.</p> <p><b>Step 3:</b> Assess how existing socioeconomic resources in the AOC as well as surrounding areas would be (have been, could be, are) altered by project(s) (proposed, past, present, and future). Perform this analysis on each of the socioeconomic components (e.g.,</p> | <p><b>Step 1:</b> Use the GIS to show the locations of types of developments and the AOCs identified within the ExROI.</p> <p><b>Step 2:</b> Use the GIS to map data relevant to socioeconomic resources across the ExROI, filling in information for the AOCs first and then for the spaces between them when this aids in efficiency or is responsive to funding constraints.</p> <p><b>Step 3:</b> Superimpose all relevant project facilities onto existing socioeconomic data to identify locations and types of impacts that may occur where these two systems (existing versus proposed built environment) or their influences overlap.</p> <p><b>Step 4:</b> Also map and evaluate the overlap of socioeconomic data (existing and proposed) with the geographic extent of data on other resources that would be adversely affected</p> |
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**Table 9. Expanded Cumulative Impact Assessment Checklist—Socioeconomics (Infrastructure, Population, Housing, Services, Employment, Economy, Environmental Justice, Noise, Aesthetics)**

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|---|---|--|
| <p>employment will be impacted.</p> <p>Identify impacts on various community services and determine whether they would need to be expanded if the proposed project were implemented.</p> <p>To implement an environmental justice analysis, use census blocks to address the ethnicity and income of the population that would be subjected to the most intense impacts from the proposed project. Analyze these data as to differential impacts on populations of specific ethnicity or income levels. Make sure this analysis covers all populations that are expected to experience significant impacts of any type from the proposed project when considered alone or collectively with other (proposed, past, present, and future) projects.</p> | <p>infrastructure, population, housing).</p> <p>Also consider whether impacts to socioeconomic resources might secondarily impact other resources (e.g., the impact of increased population and housing on wildlife populations).</p> <p>Since the AOC is based on resources of Tribal significance, most of which are associated with the natural environment, most AOC impacts will be from socioeconomic resource changes rather than on socioeconomic resources.</p>  | <p>by increased or redistributed socioeconomic components.</p>   |
| <p><b>Step 4:</b> Often socioeconomic changes are viewed as benefits rather than impacts, at least in the short term. Consider impacts that would occur at the end of a project’s life, as well as benefits from the start up of a project.</p>   | <p><b>Step 4:</b> Determine how far impacts to various resources might be from the AOC and still indirectly impact socioeconomic resources within the AOC that are important to the Tribes.</p>   | <p><b>Step 5:</b> Assess whether all of these data were considered in project documents to identify impacts and conduct additional analysis to evaluate potential impacts that were not assessed in NEPA or other documents.</p> |
| <p><b>Step 5:</b> Consider secondary impacts to other resources from socioeconomic impacts and benefits to the AOI/ROI.</p>   | <p><b>Step 5:</b> Whenever possible, use quantitative data to document impacts that have occurred and to illustrate trends that support concern regarding future impacts to socioeconomic resources. For example, if the human population increases, more acreage will be devoted to housing, more people will be using undeveloped lands for recreation, more traffic will be on the roads—all of which could have a detrimental effect on wildlife populations, especially for species that require solitude to maintain healthy populations.</p> | <p><b>Step 6:</b> Use the GIS to identify data gaps and strategic collection locations that will most cost effectively identify impacts on socioeconomic resources.</p>  |
|   | <p><b>Step 6:</b> Cross reference sections on other resources that might be secondarily impacted by socioeconomic changes.</p>  |  |

**Table 9. Expanded Cumulative Impact Assessment Checklist—Socioeconomics (Infrastructure, Population, Housing, Services, Employment, Economy, Environmental Justice, Noise, Aesthetics)**

| <b>Sources of Information–Potential Impacts:</b>   | <b>Sources of Information–Potential Impacts:</b>  | <b>Sources of Information–Potential Impacts:</b>  |
|--|---|---|
| <ul style="list-style-type: none"> <li>• Project proposal documents.</li> <li>• Reports or studies of impacts on socioeconomic resources in the AOI/ROI or the same as those that would be impacted by the proposed project in the AOI/ROI.</li> <li>• Evaluate the impacts relative to a pre-development baseline as well as relative to the current baseline.</li> </ul>                     | <ul style="list-style-type: none"> <li>• Project proposal documents.</li> <li>• NEPA or other documents prepared for projects (proposed, past, present, and future) in the AOC.</li> <li>• Reports or studies of the impacts on population, housing, services, employment, the economy, environmental justice, noise or aesthetics in the AOC or the same as those in the AOC.</li> <li>• Evaluate the impacts relative to a pre-development baseline as well as to the current baseline. For socioeconomic, these comparisons are particularly important, because they allow consideration of impacts from all socioeconomic resource components on the natural pre-development setting, as well as consideration of project impacts on the existing socioeconomic situation.</li> </ul> | <ul style="list-style-type: none"> <li>• Project proposal documents.</li> <li>• NEPA documents and their secondary references on proposed past, present, and future projects affecting socioeconomic resources throughout the ExROI, including information on AOIs, ROIs, and AOCs.</li> <li>• Assessing impacts across the entire ExROI would be a substantive benefit to understanding impacts to widespread socioeconomic resources because it would provide a detailed context within which individual project impacts could be evaluated.</li> <li>• Consideration of socioeconomic resources together with natural resources at the scale of the ExROI (using pre-development, current, and proposed scenarios) and GIS analysis of the interaction of natural and built environment at this scale provides a unique opportunity to see how the interrelationship of these systems has changed through time.</li> </ul> |
| <p><i>Also see Source List.</i></p>  | <p><i>Also see Source List.</i></p>   | <p><i>Also see Source List.</i></p>   |
| <b>Development of Mitigation Measures</b>  |   |   |
| <p><b>Step 1:</b> Evaluate whether project documents describe measures that will mitigate potential impacts on socioeconomic resources.</p>  | <p><b>Step 1:</b> Review published documents regarding other, similar mining operations in the area to determine the mitigation measures used and the success of these measures (including reclamation and off-site actions) in mitigating impacts on socioeconomic resources. For impacts on socioeconomic resources, the primary types of mitigation measures available are avoidance or increasing the built environment (e.g., more housing, more roads, more services) to supplement inadequate capacity.</p>  | <p><b>Step 1:</b> Review published documents regarding other, similar mining operations in the area to determine the mitigation measures used and the success of these measures (including reclamation and off-site actions) in mitigating impacts on socioeconomic resources. For impacts on socioeconomic resources, the primary types of mitigation measures available are avoidance or increasing the built environment (e.g., more housing, more roads, more services) to supplement inadequate capacity.</p>  |
| <p><b>Step 2:</b> Review published documents regarding other, similar mining operations in the area to determine the mitigation measures used and the success of these measures (including reclamation and off-site actions) in mitigating impacts on socioeconomic resources. For impacts on socioeconomic resources, the primary types of mitigation measures available are avoidance or</p> | <p><b>Step 2:</b> Since the AOC is based on resources of</p>  | <p><b>Step 2:</b> Evaluate measures that could mitigate the</p>   |

**Table 9. Expanded Cumulative Impact Assessment Checklist—Socioeconomics (Infrastructure, Population, Housing, Services, Employment, Economy, Environmental Justice, Noise, Aesthetics)**

|  |  |   |
|--|--|---|
| <p>increasing the built environment (e.g., more housing, more roads, more services) to supplement inadequate capacity.</p> <p><b>Step 3:</b> Assess whether mitigation measures proposed are adequate to address potential impacts.</p>  | <p>Tribal significance, most of which are associated with the natural environment, most mitigation will be developed in response to impacts from socioeconomic resource changes rather than on socioeconomic resources. However, it is also possible that impacts to non-Tribal socioeconomic resources will also impact Tribal socioeconomic resources, thus increasing the need for additional health services, police protection, fire protection, etc.</p> <p><b>Step 2:</b> Evaluate measures that could mitigate the potential impacts identified for the AOC.</p> | <p>potential impacts identified for the ExROI; consider which of the measures identified would be most effective at the geographic scale of the ExROI.</p> <p><b>Step 3:</b> Consider the “reasonable foreseeable future” scenarios developed for various projects during the NEPA process to determine “when” their collective cumulative impacts would be detrimental to Tribal needs and when mitigation should be implemented to be most effective.</p> |
| <p><b>Sources of Information–Mitigation Measures:</b></p> <ul style="list-style-type: none"> <li>• Project proposal documents.</li> <li>• NEPA and other documents related to this or other similar mining operations in area.</li> <li>• General information regarding mitigation of impacts on socioeconomic resources.</li> </ul> <p><i>Also see Source List.</i></p> | <p><b>Sources of Information–Mitigation Measures:</b></p> <ul style="list-style-type: none"> <li>• Project proposal documents.</li> <li>• NEPA and other documents discussing mitigation of impacts to socioeconomic resources from projects (proposed, past, present, and future) in the AOC.</li> <li>• General information regarding mitigation of impacts on socioeconomic resources.</li> </ul> <p><i>Also see Source List.</i></p>   | <p><b>Sources of Information–Mitigation Measures:</b></p> <ul style="list-style-type: none"> <li>• Project proposal documents.</li> <li>• NEPA documents and their secondary references on proposed past, present, and future projects affecting socioeconomic resources throughout the ExROI, including information on AOIs, ROIs, and AOCs.</li> </ul> <p><i>Also see Source List.</i></p>  |

**APPENDIX II:**  
**Information Source List (Source List)**

## Information Source List<sup>14</sup>

| Resource                  | Information Source  |
|---------------------------|---|
| <b>General References</b> |   |
| Air                       | <ul style="list-style-type: none"> <li>• <a href="#">Browse EPA Topics—Air</a>. Information on air pollutants, air pollution, air pollution control, air pollution effects, air pollution legal aspects, air pollution monitoring, air quality, atmosphere, indoor air pollution, and mobile sources.</li> </ul>  |
| Air                       | <ul style="list-style-type: none"> <li>• <a href="#">EPA, Region 5, Air and Radiation Division, Tribal Program</a>. Information on implementing Section 301 of the Clean Air Act on Tribal lands and discussion of which aspects of the Clean Air Act (CAA) are implemented by EPA and which by the Tribes. Includes links to Air Division Tribal Coordinators for Region 5 states and to Tribal air topics, Region 5 contacts, and other information.</li> </ul> |
| Air                       | <ul style="list-style-type: none"> <li>• Geographic information system (GIS) maps on air quality available through contacts listed at the following online locations: EPA Region 5, Air and Radiation Division (ARD), Tristate Initiative, <a href="#">GIS Maps</a>; and <a href="#">GIS Workgroup</a>.</li> </ul>  |
| Air                       | <ul style="list-style-type: none"> <li>• Search <a href="#">California Environmental Quality Act (CEQA)</a>, <a href="#">EPA, Minnesota Pollution Control Agency (MnPCA) State Implementation Plan</a>, <a href="#">Michigan Department of Environmental Quality (MiDEQ) State Implementation Plan</a>, and other Web sites for documents regarding mitigation measures appropriate for particular situations associated with air quality.</li> </ul>             |
| Air Quality Mitigation    | <ul style="list-style-type: none"> <li>• <a href="#">California Air Resources Board ARB Databases</a>. See especially Statewide Best Available Control Technology (BACT) Clearinghouse link.</li> </ul>   |
| Animals                   | <ul style="list-style-type: none"> <li>• <a href="#">Federal Highway Administration (FHWA) Critter Crossing site</a>. A Web site that discusses linking habitats and reducing roadkill, specifically addressing: who can benefit from this Web site, what are the issues, where do critter crossings fit in, why has the FHWA developed Critter Crossings, and want to learn more?</li> </ul>   |
| Base Map Information      | <ul style="list-style-type: none"> <li>• <a href="#">National Oceanic and Atmospheric Administration's (NOAA's) National Weather Service—OST/SEC GIS Map Group</a>. Provides links to GIS maps with various boundaries (e.g., river basins, lakes, rivers and streams, cities, urban boundaries, counties) that may be useful in preparing base maps.</li> </ul>  |

<sup>14</sup> Information sources provided for general, Minnesota, and Michigan references.

| Resource                    | Information Source  |
|-----------------------------|---|
| Cultural Resources          | <ul style="list-style-type: none"> <li>• National Park Service National Register of Historic Places (NRHP), <a href="#">National Register Information System (NRIS)</a>. Contains information on using the NRIS, an NRIS database, theme studies, historic contexts, sample nomination, a National Register (NR) bibliography, and contact information. The <a href="#">NRIS database</a> can be searched by category, using name, location, agency, subject, documentation, and data can be downloaded.</li> </ul>   |
| Cultural Resources          | <ul style="list-style-type: none"> <li>• The NRIS Index by State provides state, county, resource name, address, city, listing date for properties in the NRHP for <a href="#">individual states, including Minnesota and Michigan</a>.</li> </ul>  |
| Geology                     | <ul style="list-style-type: none"> <li>• National, statewide or local GIS databases, including such online sources as: GIS Data Depot for <a href="#">Minnesota</a>, <a href="#">Michigan</a> and other states, and <a href="#">USDA Data Gateway</a> for nationwide natural resources data.</li> </ul>   |
| Geology                     | <ul style="list-style-type: none"> <li>• <a href="#">Soil Survey Geographic (SSURGO)</a>. This Web page provides information on SSURGO, and digitized and downloadable versions of the SSURGO database. Not all SSURGO data have been digitized yet, with completion scheduled for 2008. Additional information can be obtained from the State Soil Scientists whose contact information is linked to this Web page. Downloads from <a href="#">Soil Data Mart</a>.</li> </ul>  |
| Geology                     | <ul style="list-style-type: none"> <li>• <a href="#">State Soil Geographic (STATSGO)</a>. This Web page provides information on STATSGO, and digitized and downloadable versions of the STATSGO database, including both spatial and tabular data. Downloads from <a href="#">Soil Data Mart</a>.</li> </ul>  |
| Geology, Air, Water Impacts | <ul style="list-style-type: none"> <li>• <a href="#">Best Management Practices (BMPs)</a> to minimize impacts, including prevention of soil erosion and consequent protection of air and water quality. Also check BMP documents developed for national audiences (e.g., <a href="#">Urban Storm Drainage Criteria Manual</a>) and for other state agencies (e.g., <a href="#">Colorado Department of Transportation</a>).</li> </ul>   |
| Multiple Media              | <ul style="list-style-type: none"> <li>• <a href="#">EPA Region 5, Indian Environmental Office (IEO)</a>. Provides an overview of the purpose of the IEO, links to a Direct Implementation Strategy for Indian Country, and the 2006 Indian General Assistance Program Conference. A Where You Live link provides further links to Web sites for individual Tribes by state, and a Committees &amp; Workgroups link provides information and links to the Regional Tribal Operation Committee and Agency-Wide Committees &amp; Workgroups. Contact information on this Web site provides a starting point for assistance with Federal environmental programs and financial and technical assistance related to the</li> </ul> |

| Resource       | Information Source  |
|----------------|---|
| Multiple Media | <p>development and delegation of Tribal environmental programs.</p> <ul style="list-style-type: none"> <li>• <a href="#">GIS Data Depot</a>. Extensive GIS and Geospatial data, including U.S. Geological Survey (USGS) digital raster graphics (DRGs), USGS digital elevation models (DEMs), USGS digital orthoimagery quarter quadrangles (DOQQs), Federal Emergency Management Agency (FEMA) flood data, Vector Map (VMAP), National Wetlands Imagery (NWI), Gazetteer, Census/TIGER, Index Grids—downloadable by state or county.</li> </ul>  |
| Multiple Media | <ul style="list-style-type: none"> <li>• <a href="#">Natural Resources Conservation Service (NRCS) GIS</a> data on climate, digital elevations, digital orthophotoquads, DRGs, soils (SSURGO and STATSGO), and watershed boundaries.</li> </ul>   |
| Multiple Media | <ul style="list-style-type: none"> <li>• Other sites that are listed in aggregate at the <a href="#">U.S. Fish &amp; Wildlife Service (USFWS) Geographic Information Systems &amp; Spatial Data Portal</a>. Geospatial data links include USFWS sites, geospatial one-stop portal, sites organized by agency, national datasets, state datasets, datasets organized by type, biological data, satellite and aerial imagery, interactive mapping links, geocommunicator (Bureau of Land Management [BLM] National Integrated Land System), U.S. Department of Agriculture (USDA) Geospatial data gateway, and fire data and sites.</li> </ul>  |
| Multiple Media | <ul style="list-style-type: none"> <li>• <a href="#">USDA Forest Service</a>. Information links to: employment; fire &amp; aviation; international; just for kids; maps &amp; brochures; passes &amp; permits; photo &amp; video gallery; projects and policies; publications, regulations, &amp; manuals; recreational activities; research &amp; development; safety; and state &amp; private forestry. Particularly useful are the <a href="#">links to the national forests by state</a> (e.g., Hiawatha, Huron-Manistee, and Ottawa in Michigan; Chippewa and Superior in Minnesota). For a given forest, the links to environmental analysis on the projects and plans Web page provide particularly useful information (e.g., <a href="#">Project Planning on the Hiawatha National Forest</a>, or <a href="#">Environmental Analysis on Chippewa National Forest</a>).</li> </ul> |
| Multiple Media | <ul style="list-style-type: none"> <li>• <a href="#">USDA Data Gateway</a>. GIS and other formats; data for selected polygon on common land units, 8-digit hydrologic units, map indices, 10-m and 30-m elevation, ortho imagery, soils, climate_precipitation, climate_temperature.</li> </ul>   |
| Multiple Media | <ul style="list-style-type: none"> <li>• <a href="#">USGS Water Resources of the United States</a>. Information on publications, water data, studies, groundwater recharge, and related links, including NWISWeb water data (real-time, surface water, groundwater, water quality, site inventory),</li> </ul>  |

| Resource                             | Information Source   |
|--------------------------------------|--|
| Multiple Media of Interest to Tribes | <p>water resources programs, water information topics, and regional studies.</p> <ul style="list-style-type: none"> <li>• <a href="#">Great Lakes Indian Fish and Wildlife Commission</a>. An interactive Web site that provides maps of invasive species, invasive species surveys, control efforts, places, administrative units, transportation, and hydrography, as well as weather (temperature, radar severe weather, and cloud cover), imagery (aerial photo, 2007 satellite image, 1999-2003 satellite mosaic), and relief backgrounds (USGS topo map, 30-m shaded relief, and 1-km color shaded relief).</li> </ul> |
| NEPA                                 | <ul style="list-style-type: none"> <li>• <a href="#">USFWS Region 3 Midwest Internet Site—NEPA</a>. List of available Environmental Assessments (EAs), Environmental Impact Statements (EISs), and other environmental documents for the USFWS’s Region 3. New projects are no longer being added to this Web site, but links are provided to NEPA documents on Comprehensive Conservation Plans and endangered species.</li> </ul>  |
| Plants                               | <ul style="list-style-type: none"> <li>• <a href="#">Potential Vegetation of the Conterminous US</a>. Information on physiographic regions, vegetation form, and vegetation type to provide context for local plant communities.</li> </ul>  |
| Plants, Animals                      | <ul style="list-style-type: none"> <li>• <a href="#">NatureServ</a>. Plants, vertebrate animals, invertebrate animals, ecological units, invasive species—searchable database by species or state; species-specific information on conservation status, distribution, ecology and life history, economic attributes, management summary, population/occurrence delineation, population/occurrence viability, and U.S. invasive species impact rank (I-rank).</li> </ul>  |
| Plants, Animals—Invasives            | <ul style="list-style-type: none"> <li>• <a href="#">FHWA Invasive Species Web site</a>. Provides links to: Roadsides Invasives Field Guide; Distribution Memo: Proceedings of the 2002 Weeds Across Borders Conference; National Invasive Species Management Plan; Executive Order on Invasive Species; Federal Interagency Committee for the Management of Noxious and Exotic Weeds; In Controlling Roadside Invasive Species; PowerPoint on Invasive Plants—what they are and how to win the war on weeds.</li> </ul>   |
| Plants, Animals—Invasives            | <ul style="list-style-type: none"> <li>• <a href="#">USFWS Invasive Species Web site</a>. This Web site in under construction (May 2007) but should be updated and available “soon”.</li> </ul>  |
| Plants, Animals—Species of Concern   | <ul style="list-style-type: none"> <li>• <a href="#">USFWS—Species Information, Threatened and Endangered (T&amp;E) Animals and Plants</a>. Includes extensive information on T&amp;E species, a section on Endangered Species Act (ESA) and What We Do (Candidate Conservation, Consultations, Grants, Habitat Conservation Plans [HCPs], International</li> </ul>  |

| Resource       | Information Source  |
|----------------|---|
|                | <p>Activities, Landowner Tools, Listing, Permits, Publications, Recovery, Working with Tribes), as well as links to: <a href="#">How Many, and Which, Species...are listed in the U.S. as threatened or endangered?</a>; <a href="#">are listed in each State?</a>; <a href="#">are listed in other countries?</a>; <a href="#">are listed and are under the primary responsibility of the NOAA Fisheries (NMFS)?</a>; <a href="#">were the first species to be listed?</a>; <a href="#">are proposed for listing?</a>; <a href="#">are candidates for listing?</a>; <a href="#">are proposed species under the primary responsibility of the NOAA Fisheries (NMFS)?</a>; <a href="#">have critical habitat designated?</a>; <a href="#">have experimental populations of reintroduced individuals?</a>; <a href="#">have special rules under section 4(d) to customize the protections of the ESA?</a>; <a href="#">have special rules?</a>; <a href="#">have been removed from the List (delisted) and why?</a>; <a href="#">have been reclassified (change in status)?</a>; <a href="#">are proposed for a status change or delisting?</a></p> |
| Socioeconomics | <ul style="list-style-type: none"> <li>● <a href="#">Environmental Justice Guidance Under the National Environmental Policy Act</a>. Information on Executive Order 12898 and the Presidential Memorandum, Executive Order 1298 and National Environmental Policy Act (NEPA) (NEPA Generally, Principles for Considering Environmental Justice under NEPA, Considering Environmental Justice in Specific Phases of the NEPA Process, Where no Environmental Impact Statement [EIS] or Environmental Assessment [EA] is Prepared), Regulatory Changes, Effect of this Guidance, Appendix: Guidance for Agencies on Key Terms in Executive Order 12898.</li> </ul>  |
| Socioeconomics | <ul style="list-style-type: none"> <li>● <a href="#">U.S. Census Bureau Decennial Data Description</a>. Major data source for Census 2000 and Census 1990 data; describes the contents of the major downloadable files containing census data:           <ul style="list-style-type: none"> <li>– Summary File (SF) 1 presents counts and information (e.g., age, sex, race, Hispanic/Latino origin, household relationship, whether residence is owned or rented) collected from all people and housing units</li> <li>– SF 2 contains population and housing characteristics iterated for many detailed race and Hispanic or Latino categories, and American Indian and Alaska Native tribes</li> <li>– SF 3 presents detailed population and housing data (e.g., place of birth, education, employment status, income, value of housing unit, year structure built) collected from a 1-in-6 sample and weighted to represent the total population</li> </ul> </li> </ul>   |

| Resource                                 | Information Source  |
|--|---|
|  | <ul style="list-style-type: none"> <li>– SF 4 contains tabulations of population and housing data collected from a sample of the population. The data are shown down to the census tract level for 336 race, Hispanic or Latino, American Indian and Alaska Native, and ancestry categories.</li> </ul>   |
| Socioeconomics                           | <ul style="list-style-type: none"> <li>• <a href="#">U.S. Census Bureau Download Center</a>. Provides a location where experienced users can download the SF 1, SF 2, SF 3, and SF 4 census data files, as well as the Census 2000 American Indian and Alaska Native Summary File (AIANSF) – Sample Data; 110<sup>th</sup> Congressional District Summary File (Sample); 110<sup>th</sup> Congressional District Summary File (100 percent); Census 2000 Redistricting Data (P.L. 94-171) Summary File; 2004 and 2005 American Community Surveys; 2005 and 2006 Population Estimates and Projections; 2002 Economic Census; and 2003, 2004, 2005 Annual Economic Surveys.</li> </ul>  |
| Socioeconomics                           | <ul style="list-style-type: none"> <li>• <a href="#">U.S. Census Bureau Question and Answer Center</a>. Provides 173 searchable answers to the most common questions about the census.</li> </ul>   |
| Socioeconomics—<br>Environmental Justice | <ul style="list-style-type: none"> <li>• <a href="#">Executive Order 12898</a>. Text of the Executive Order: Federal Actions to Address Environmental Justice Minority Populations and Low-Income Populations.</li> </ul>   |
| Soil, Water, Water<br>Quality            | <ul style="list-style-type: none"> <li>• Online Web sites providing BMPs associated with erosion control are often developed to address water quality (e.g., <a href="#">Urban Drainage and Flood Control District, Urban Storm Drainage Criteria Manual</a>; <a href="#">Colorado Department of Transportation [CDOT], Municipal Separate Storm Sewer System [MS4] Discharge Permit Topics</a> [See especially CDOT Erosion Control and Stormwater Quality Guide Chapters 4, 5, and 6; Drainage Design Manual Chapter 16 and Appendices 19-I and 19-II; New Development and Redevelopment Program, Permanent BMP Factsheets]; <a href="#">Minnesota Pollution Control Agency Protecting Water Quality in Urban Areas—A Manual</a>); <a href="#">Guidebook of Best Management Practices for Michigan Watersheds</a>; or the MiDNR Manual on <a href="#">Best Management Practices (BMP) on Forest Lands</a>.</li> </ul> |
| Water                                    | <ul style="list-style-type: none"> <li>• <a href="#">EPA Water Pollution Control</a>. Links to EPA’s Source Water Protection and National Pollutant Discharge Elimination System (NPDES) Web pages; information on extensive water pollution control subtopics under the headings of aquatic ecosystems, drinking water, ground water, storm water, surface water, wastewater, water pollutants, water</li> </ul>   |

| Resource                             | Information Source   |
|--------------------------------------|--|
| Water                                | <p>pollution, water pollution control, water pollution effects, water pollution legal aspects, and water quality monitoring.</p> <ul style="list-style-type: none"> <li> <a href="#">USGS Water Resources of the United States</a>. Links to National Water Information System Web Interface (NWISWeb) Water Data (real-time, surface water, ground water, water quality, site inventory), Water Resources Programs (cooperative water program, national streamflow information program, national water quality assessment program, toxic substances hydrology program, ground water resources program, hydrologic research and development, state water resources research institute program, international water projects, water information coordination program), water information by topic (ground water, surface water, water quality, water use, software, national research program, USGS water programs), and regional studies. The NWISWeb links in particular provide access to the extensive body of nationwide USGS water data that can be sorted by data category, geographic area, and specific data type.         </li> </ul> |
| Wetland Mitigation                   | <ul style="list-style-type: none"> <li> <a href="#">U.S. Army Corps of Engineers (USACE)—Draft EA, Finding of No Significant Impact (FNSI), and Regulatory Analysis for Proposed Compensatory Mitigation Regulation</a>. An EA and FNSI on three alternatives for the proposed rule. The preferred alternative is a watershed approach to compensatory mitigation, which involves permittee-responsible mitigation and mitigation banks to provide compensatory mitigation as well as a revised in-lieu fee program. The no-action alternative involves the continued reliance on existing compensatory mitigation guidance. The third alternative is the watershed approach to compensatory mitigation, with in-lieu fee programs subjected to somewhat different standards and requirements than mitigation banks.         </li> </ul>   |
| Wetland/Aquatic Ecosystem Mitigation | <ul style="list-style-type: none"> <li> <a href="#">USACE Responds Positively to NRC/NAS Report on Mitigation</a>. Contains links to several USACE documents on mitigation.         </li> </ul>  |
| Wetland/Aquatic Ecosystem Mitigation | <ul style="list-style-type: none"> <li> <a href="#">USACE—Mitigation/Environmental Frequently Asked Questions</a>. Information on USACE mitigation.         </li> </ul>  |
| Wetlands                             | <ul style="list-style-type: none"> <li> <a href="#">National Wetlands Inventory</a>. Interactive Web site with Wetlands Mapper (view/download/print maps of wetland digital data), Wetlands Data Extraction Tool (download seamless digital wetlands data), map information (status, photographic era, metadata and map search, hard copy maps, code definitions, and wetlands definition), as well as links to wetland information on a variety of topics (e.g., wetland         </li> </ul>  |

| Resource                             | Information Source  |
|--------------------------------------|---|
| Wetlands                             | <p>functions, wetland plants, status and trends, publications, geodatabase fact sheet, kids and educators, service programs, and other links).</p> <ul style="list-style-type: none"> <li>• <a href="#">USGS National Wetlands Research Center (NWRC)</a>. Information about wetlands, NWRC, issues and capabilities, NWRC library, data and maps, staff profiles, site index, photo credits, and search capability.</li> </ul> |
| <b>Minnesota References</b>          |   |
| Air                                  | <ul style="list-style-type: none"> <li>• <a href="#">MnPCA Environmental Data Access (EDA)</a>. Portal to water quality and air quality data, background on the EDA system, comments, feedback, and question opportunities.</li> </ul>  |
| Air                                  | <ul style="list-style-type: none"> <li>• <a href="#">MnPCA Air Data</a>. Information on air quality, air emissions, air toxics, special pollutants, regulations, assistance, related topics, and general topics.</li> </ul>   |
| Air                                  | <ul style="list-style-type: none"> <li>• <a href="#">MnPCA Air Toxics Data</a>. Information on air toxics sources, air toxic concentrations, limiting air toxic releases, links, and more.</li> </ul>   |
| Air                                  | <ul style="list-style-type: none"> <li>• <a href="#">MnPCA EDA—Air Quality Data</a>. Information on ambient monitoring stations, point sources of pollution, emissions by county, geographic location, information on specific pollutants, and additional topics (overview of search tools, glossary of terms, downloading data, monitored pollutants, comments and questions). Data can be searched and downloaded.</li> </ul> |
| Air, Water                           | <ul style="list-style-type: none"> <li>• <a href="#">MnPCA EDA</a> provides water quality data, air quality data, and groundwater data (available in the future).</li> </ul>  |
| Animals                              | <ul style="list-style-type: none"> <li>• <a href="#">Minnesota Department of Natural Resources (DNR) Ecological Services—Nongame Wildlife Program</a>. Additional data may be obtained through area biologists for the <a href="#">Northwest</a>, <a href="#">Northeast</a>, <a href="#">Central</a>, and <a href="#">South</a> Minnesota regions.</li> </ul>   |
| Base Map Information, Multiple Media | <ul style="list-style-type: none"> <li>• <a href="#">MN County-Specific Data</a>. Includes DEMs, digital line graphs, DRGs, enhanced (collarless) DRGs, FEMA Q3 Flood Data, Landuse/Land Cover, NWI wetlands, orthoimagery, U.S. Census Bureau Tiger/Line Files, and 24K Quad grid, as shown for <a href="#">St. Louis County</a>.</li> </ul>   |
| Chemicals                            | <ul style="list-style-type: none"> <li>• <a href="#">MnPCA Mercury</a>. Informational links, fact sheets, and publications (progress reports, estimated emissions in Minnesota, emissions from electricity generation, voluntary mercury reduction progress reports).</li> </ul>  |
| Chemicals                            | <ul style="list-style-type: none"> <li>• <a href="#">MnPCA Remediation Sites</a>. Individual sites, sites by programs (e.g., Brownfields, Emergency Response, Landfills, Natural Attenuation, Resource Conservation and Recovery Act [RCRA], Superfund, Tanks, Voluntary Investigation and</li> </ul>   |

| Resource           | Information Source   |
|--------------------|--|
| Chemicals          | <p>Cleanup [VIC]), and related links; includes search capability.</p> <ul style="list-style-type: none"> <li>• <a href="#">MnPCA—What’s in My Neighborhood?</a> Text-based and GIS-based search (on city/town/place, site ID, site name, street address, township/range, zip code) capabilities for information on Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS), No Further Remedial Action Planned (NFRAP), Superfund, Solid Waste, State Assessment, Unpermitted Dump, VIC, Closed Landfill, RCRA Treatment, Storage, and Disposal (TSD), and RCRA Investigation/Cleanup sites.</li> </ul>  |
| Chemicals          | <ul style="list-style-type: none"> <li>• <a href="#">MPCA Perfluorochemicals (PFCs)</a>. Informational links, fact sheets, sampling and pilot test for groundwater treatment at Washington County landfill, sampling in Lake Elmo and Oakdale, active landfill evaluation, sediment and fish tissue sampling for PFCs from the Mississippi River, oversight of 3M Superfund and VIC sites, more.</li> </ul>  |
| Climate            | <ul style="list-style-type: none"> <li>• <a href="#">MnPCA—Global Climate Change and Its Impact on Minnesota</a>. Informational articles, including greenhouse gas emission trends in Minnesota and potential effect of climate change on Minnesotans and their environment.</li> </ul>  |
| Cultural Resources | <ul style="list-style-type: none"> <li>• <a href="#">Minnesota Historical Society, Minnesota’s State Historic Preservation Office (SHPO)</a>. Information provided on preservation planning, survey and inventory, preservation programs, and review and compliance. Also includes links providing information about SHPO; to contact SHPO; grants; how do I...; interpreter/planner; local history services; national register; preservation conference, legislation, players, plan; reuse studies; tax credits; using SHPO files; Advisory Council on Historic Preservation; preservation briefs; Secretary of the Interior’s Standards; Tribal Historic Preservation Offices; and related books.</li> </ul> |
| Feedlots           | <ul style="list-style-type: none"> <li>• <a href="#">MnPCA Feedlot Environmental Review</a>. Review of program, guidelines, regulations, exemptions.</li> </ul>  |
| Geology            | <ul style="list-style-type: none"> <li>• GeoCommunity—<a href="#">Geologic Data for MN</a>. Downloadable data on Minnesota geology—primarily soils data, DRGs, DEMs, and DOQQs.</li> </ul>   |
| Geology            | <ul style="list-style-type: none"> <li>• National, statewide or local GIS databases, including such online sources as: <a href="#">GIS Data Depot</a> and <a href="#">USDA Data Gateway</a>.</li> </ul>  |
| Groundwater        | <ul style="list-style-type: none"> <li>• <a href="#">MnPCA—Groundwater in Minnesota</a>. Information about groundwater; publications; data, maps, methods; MPCA groundwater programs.</li> </ul>   |
| Multiple Media     | <ul style="list-style-type: none"> <li>• <a href="#">GIS Data Depot—Minnesota data</a> . Statewide or countywide GIS formats for multiple media.</li> </ul>  |

| Resource                     | Information Source  |
|------------------------------|---|
| Multiple Media               | <ul style="list-style-type: none"> <li>• <a href="#">Minnesota Department of Natural Resources (MnDNR)</a>. Includes links to data on fish and wildlife, fisheries, forestry, lakes, lands and minerals, maps, natural resources, parks and recreation, publications, search engine, trails and waterways, waters division, and wildlife.</li> </ul>  |
| Multiple Media               | <ul style="list-style-type: none"> <li>• <a href="#">Minnesota Natural Heritage Information System</a>. Accepts data requests by mail or fax on rare features, including rare plants, rare animals, native plant communities, geologic features, and animal aggregations. County-by-county surveys have been completed for some counties.</li> </ul>  |
| Multiple Media               | <ul style="list-style-type: none"> <li>• <a href="#">MnPCA Environmental Indicators</a>. Includes the following information on Environmental Indicators: St. Croix Basin Assessment, St. Croix Basin Nutrient Goals, Alternative Fuel Use at the MPCA—An Update, Putting the Twin Cities Metropolitan Area Groundwater Model to Work, Air Quality Trends in Minnesota, and Archives.</li> </ul>   |
| Multiple Media               | <ul style="list-style-type: none"> <li>• <a href="#">MnPCA Searchable Environmental Data</a>. Links to searchable data, including: air quality index, air quality data, air toxics facility actual emissions, citizen lake monitoring data, criteria air pollutant emissions in Minnesota, environmental data access, EPA ID number, hazardous waste manifests, lake water quality data, leaking underground storage tank sites, RCRA cleanup site search, STORET program, Superfund site information, VIC sites, water quality data, and what’s in my neighborhood.</li> </ul>                                   |
| Multiple Media               | <ul style="list-style-type: none"> <li>• <a href="#">USGS Water Resources of the United States—Minnesota</a>. Information on publications, water data, studies, groundwater recharge, and related links, including biology of the upper Midwest, mapping Minnesota, and geology of the upper Midwest.</li> </ul>  |
| Multiple Media—<br>Chemicals | <ul style="list-style-type: none"> <li>• <a href="#">MnPCA</a>. Extensive links to information on air toxics, biological monitoring, contaminated sediments, eco experience, environmental data access, environmental indicators, environmental innovations, environmental monitoring, environmental review, ethanol in Minnesota, feedlots, global warming, lakes, impaired waters and total maximum daily loads (TMDLs), mercury, PFCs, remediation sites, search environmental data, septic systems, stormwater, volunteer water monitoring, wastewater, what’s in my neighborhood, and wood smoke.</li> </ul> |
| NEPA                         | <ul style="list-style-type: none"> <li>• <a href="#">MnPCA—Environmental Assessment Worksheets (EAWs) and EISs</a>. Current EAWs open for review, current environmental impact statements open for review, citizens’ petition for EAW determination, recent environmental</li> </ul>  |

| Resource                            | Information Source   |
|-------------------------------------|--|
|                                     | <p>reviews of interest, about the environmental review program, instructions on preparing an EAW for the MPCA, EAW forms, and more.</p>  |
| Plants, Animals                     | <ul style="list-style-type: none"> <li>• <a href="#">Gap Analysis Program (GAP) data for Minnesota</a>. Datasets are available by <a href="#">1:100,000-scale USGS quadrangle tiles</a>—only 15 such tiles appear to be available currently.</li> </ul>  |
| Plants, Animals                     | <ul style="list-style-type: none"> <li>• <a href="#">MnDNR Natural Heritage and Nongame Research Program</a>. Provides links to: research reports, research, native plant communities, endangered species permits and lists, animal aggregation sites list, and more.</li> </ul>   |
| Plants, Animals                     | <ul style="list-style-type: none"> <li>• <a href="#">MnDNR—Endangered, Threatened, and Special Concern Species</a>. Lists species by taxa and by scientific name; provides links to Federal information, permits, and National Heritage and Nongame Research Program. Provides a portable document format (PDF) version of the T&amp;E list.</li> </ul>  |
| Plants, Animals                     | <ul style="list-style-type: none"> <li>• <a href="#">MnPCA Biological Monitoring</a>. Streams: fish, aquatic invertebrates, algae. Wetlands: plants, aquatic invertebrates.</li> </ul>   |
| Plants, Animals—<br>Special Concern | <ul style="list-style-type: none"> <li>• <a href="#">MnDNR—Endangered, threatened &amp; special concern species</a>. Includes definitions of T&amp;E species, Minnesota’s endangered species laws, links to state-listed species (including their distribution by county), as well as to Federal laws and the <a href="#">Natural Heritage and Nongame Research Program</a>.</li> </ul>                                    |
| Plants, Animals—<br>Special Concern | <ul style="list-style-type: none"> <li>• <a href="#">USFWS Endangered Species in Minnesota</a>. County of occurrence identified for each Federally listed species.</li> </ul>  |
| Plants, Animals—<br>Special Concern | <ul style="list-style-type: none"> <li>• <a href="#">USFWS Threatened and Endangered Species System (TESS)—Minnesota</a>. State-listed threatened/endangered species in Minnesota; also available by <a href="#">major taxon in a PDF list</a>.</li> </ul>   |
| Sediment                            | <ul style="list-style-type: none"> <li>• <a href="#">MnPCA Contaminated Sediments</a>. Includes links to the following studies: St. Louis River Area of Concern (AOC), Mississippi River, statewide; regional sediment databases; web references for assessment, management, and remediation; other links; and more information.</li> </ul>  |
| Surface Water                       | <ul style="list-style-type: none"> <li>• <a href="#">MnPCA EDA—Water Quality Data</a>. Text-based search for surface water monitoring sites and data, map-based search for surface water monitoring sites and data, map-based search for surface water conditions (assessments); includes EPA STORET data.</li> </ul>  |
| Surface Water                       | <ul style="list-style-type: none"> <li>• <a href="#">MnPCA Lakes in Minnesota</a>. Citizen lake-monitoring program, charging lake data, frequently asked questions about lakes, lake water quality assessment program, Lake Superior, toxic algae. Also links to: water rules and regulations, clean water partnership program, lake monitoring activities, environmental data access, lake finder-MnDNR, water</li> </ul> |

| Resource                         | Information Source   |
|----------------------------------|--|
| Water                            | <p>resources-MnDNR, fishing regulations-MnDNR, and EPA’s clean lake program.</p> <ul style="list-style-type: none"> <li>• <a href="#">Minnesota Precipitation Data</a>. Historical climate data retrieval including the following topics: interactively retrieve climate data, storm events, obtaining historical climate data for legal purposes.</li> </ul>  |
| Water                            | <ul style="list-style-type: none"> <li>• <a href="#">MnPCA Water</a>. Surface water, groundwater, wastewater general information, regulations, assistance, and related topics.</li> </ul>  |
| Water                            | <ul style="list-style-type: none"> <li>• National, statewide or local GIS databases, including such online sources as: <a href="#">GIS Data Depot</a> and <a href="#">USDA Data Gateway</a>.</li> </ul>  |
| Water (especially water quality) | <ul style="list-style-type: none"> <li>• <a href="#">MnPCA—Minnesota’s Impaired Waters and TMDLs</a>. Includes the following sections: background, TMDL list of impaired waters in Minnesota, maps of impaired waters, TMDL assessment supporting material, publications, draft TMDLs, final TMDLs and implementation plants, TMDL project status and staff contacts, TMDL financial assistance and contracting, TMDL notices and rules, notices and events, archives of past final TMDL lists, links to related sites, more, and a glossary.</li> </ul>                         |
| Water (including Wetlands)       | <ul style="list-style-type: none"> <li>• <a href="#">MnPCA Basins and Watersheds</a>. Information on major Minnesota basins/watersheds and links to Web pages on water, lakes, streams and rivers, groundwater, publications about water, Lake Superior basin, Minnesota River basin, Mississippi River basin, Rainy River basin, Red River of the North basin, St. Croix River basin and related information on environmental data, impaired waters, nonpoint sources, phosphorus strategy, 305b assessments, targeted watershed grants, and watershed achievements.</li> </ul> |
| Water (including Wetlands)       | <ul style="list-style-type: none"> <li>• <a href="#">MnPCA Contaminated Sediments</a>. Information on MPCA sediment studies, regional sediment databases, Web-related references, and other sites.</li> </ul>  |
| Water—Stormwater                 | <ul style="list-style-type: none"> <li>• <a href="#">MnPCA Stormwater Program</a>. Information on permitting and stormwater program.</li> </ul>  |
| Water—Surface Water              | <ul style="list-style-type: none"> <li>• <a href="#">MnPCA Volunteer Surface Water Monitoring</a>. Citizen lake-monitoring program, citizen stream-monitoring program, wetland health monitoring program.</li> </ul>   |
| Water—Wastewater                 | <ul style="list-style-type: none"> <li>• <a href="#">MnPCA Minnesota’s Individual Sewage Treatment Systems Program</a> (ISTS). Provides information on rules, fees, financial assistance, and other.</li> </ul>  |
| Water—Wastewater                 | <ul style="list-style-type: none"> <li>• <a href="#">MnPCA Wastewater</a>. Includes information on planning and reports, sanitary districts, financial assistance, permits,</li> </ul>   |

| Resource                        | Information Source   |
|---------------------------------|--|
| Wetlands                        | environmental review, engineering/technical, ISTS, operation/maintenance/reporting/awards, certification and training, pretreatment, and assistance. <ul style="list-style-type: none"> <li>• <a href="#">MnPCA Wetlands Information</a>, including wetland water quality standards and monitoring.</li> </ul>   |
| <b>Michigan References</b>      |  |
| Air                             | <ul style="list-style-type: none"> <li>• <a href="#">MiDEQ—Air</a>. Information on air monitoring, air toxics, assessment and planning, clean air assistance, compliance, emissions, enforcement, Air Quality Division (AQD) district map, air publications, open burning information, mercury, 8-hour ozone maps, ozone nonattainment and NSR implementation Q&amp;A, woodburning &amp; air quality, Michigan air emissions reporting system (MAERS) query tools, air toxics screening level query, air emissions trading.</li> </ul> |
| Air                             | <ul style="list-style-type: none"> <li>• <a href="#">MiDEQ—Air Toxics</a>. Provides information on special topics (Hamtramck Area health statistics review, Detroit air toxics initiative, atmospheric mercury sources in the Great Lakes states, Great Lakes regional workshop, air toxics monitoring strategy), laws and rules, and screening levels, as well as links to topics such as pollutants of concern in Michigan.</li> </ul>   |
| Air                             | <ul style="list-style-type: none"> <li>• <a href="#">MiDEQ—Assessment and Planning</a>. Information on attainment/nonattainment, mobile sources, state implementation plan, emissions trading, modeling and meteorology, and a link to current air quality planning activities.</li> </ul>   |
| Air                             | <ul style="list-style-type: none"> <li>• <a href="#">MiDEQ—Emissions</a>. Information on annual emission fees and emissions reporting.</li> </ul>  |
| Air                             | <ul style="list-style-type: none"> <li>• <a href="#">MiDEQ—Monitoring</a>. Provides information on monitoring sites for ozone, PM 2.5, carbon monoxide, sulfur dioxide, nitrogen dioxide, PM 10, lead, photochemical assessment, toxics, and Detroit air toxics. Also provides reports and data summaries on ozone, annual air quality, and the air toxics monitoring strategy for Michigan.</li> </ul>  |
| Air, Chemicals, Water Resources | <ul style="list-style-type: none"> <li>• <a href="#">MiDEQ</a>. Information on air, land, waste, and water.</li> </ul>   |
| Animals (aquatic)               | <ul style="list-style-type: none"> <li>• <a href="#">Michigan Department of Natural Resources (MiDNR)-Fishing</a>. Information on fish kills, seasons and guides for angling seasons, marked and tagged fish (provides information on migration, survival, and harvest of fish stocks), Lake Michigan and Lake Huron Reference Maps (showing lake trout refuges, tribal commercial fishing zones, and recent state-licensed commercial fishing areas).</li> </ul>  |
| Animals (terrestrial)           | <ul style="list-style-type: none"> <li>• <a href="#">MiDNR—Hunting</a>. Information on wildlife management units, state game or wildlife areas, wildlife offices, and game</li> </ul>  |

| Resource                                   | Information Source   |
|--|--|
| Base Map Information,<br>Multiple Media    | <p>species—black bear, elk, furbearers, small game, upland game birds, waterfowl, white-tailed deer, and wild turkey.</p> <ul style="list-style-type: none"> <li>• <a href="#">MI County-Specific Data</a>. Includes DEMs, digital line graphs, DRGs, enhanced (collarless) DRGs, FEMA Q3 Flood Data, Landuse/Land Cover, NWI wetlands, orthoimagery, U.S. Census Bureau Tiger/Line Files, and 24K Quad grid, as shown for Gogebic <a href="#">County</a>.</li> </ul>  |
| Chemicals, Water                           | <ul style="list-style-type: none"> <li>• <a href="#">MiDEQ—Waste</a>. Information on hazardous and liquid industrial waste, hazardous and liquid industrial waste transporters, low level radioactive waste, medical waste, radiological protection, scrap tires, solid waste, waste compliance &amp; enforcement. Additional links to MiDEQ calendar, who does what, publications, acronyms, laws and rules, public comment opportunities, staff, forms, training &amp; workshops, dioxin information, how to handle waste, and recycling. A hazardous waste treatment, storage and disposal facility directory; recycled materials market directory (RMMD); septage haulers directory; septage receiving facility directory, and waste data system (WDS) are also provided.</li> </ul> |
| Climate                                    | <ul style="list-style-type: none"> <li>• <a href="#">Michigan Climate Map</a>. Clickable map that provides access to tabular data on climate (normals and extremes by month and year; average daily maximum, minimum, and mean temperature; monthly and seasonal growing degree-days; monthly and annual total precipitation and snowfall; and similar data) from 1971-2000 and 1951-1980 periods for weather stations in individual Michigan counties.</li> </ul>   |
| Cultural Resources                         | <ul style="list-style-type: none"> <li>• <a href="#">Michigan’s SHPO</a>. Information provided on the office, their services and collections, and programs. Includes links to information on the NRHP in Michigan, National Historic Landmarks in Michigan, Michigan’s Historic Resources Survey Program, Michigan’s Historical Marker Program, Michigan’s Centennial Farm Program, The Michigan Lighthouse Program, Michigan Main Street Program, Environmental Review (Section 106 responsibilities), Local Historic Districts, and Historic Preservation Financial Incentives, as well as to spotlighted information and coming events.</li> </ul>  |
| Geologic Resources,<br>Chemicals, Land Use | <ul style="list-style-type: none"> <li>• <a href="#">MiDEQ—Land</a>. Information on gas, oil, and minerals; geological mapping; geology in Michigan; land cleanup; land development; land redevelopment; sand dunes; soil erosion and sedimentation control; storage tanks (aboveground and underground); Michigan environmental mapper; why a geologic mapping coalition?; brownfield-UST field site directory; leaking underground storage tank sites; online oil</li> </ul>   |

| Resource       | Information Source   |
|----------------|--|
| Geology        | & gas information system; Part 201 site search; soil erosion & sedimentation control permitting agency directory; storage tank information center; underground storage tank list. <ul style="list-style-type: none"> <li>• GeoCommunity—<a href="#">Geologic Data for MI</a>. Downloadable data on Michigan geology—primarily soils data, DRGs, DEMs, and DOQQs.</li> </ul>  |
| Multiple Media | <ul style="list-style-type: none"> <li>• <a href="#">GIS Data Depot—Michigan data</a>. Statewide or countywide GIS formats for multiple media.</li> </ul>  |
| Multiple Media | <ul style="list-style-type: none"> <li>• <a href="#">Michigan Center for Geographic Information, Department of Information Technology</a>. GIS data on multiple themes— aerial imagery, base map features, census, geology, groundwater, hydrography, land cover/use, management boundaries, mineral management, ownership, place features, plant and animal locations, political features, public land survey features, satellite imagery, soils, topography, transportation, and utilities. These data can also be searched by geographic extent (statewide, county, watershed).</li> </ul>  |
| Multiple Media | <ul style="list-style-type: none"> <li>• <a href="#">Michigan.gov</a>. Listing of State of Michigan Departments, including several that are relevant to cumulative impact assessment—agriculture; civil rights; environmental quality; history, arts, and libraries; human services; labor &amp; economic growth; natural resources; state police; transportation.</li> </ul>  |
| Multiple Media | <ul style="list-style-type: none"> <li>• <a href="#">MiDEQ—Maps &amp; Data</a>. A consolidation of information on MiDEQ maps, including map sources, Michigan geological survey maps &amp; publications, topographic maps of Michigan, and downloadable maps of Michigan’s major watersheds (PDF), high risk erosion areas (digital), and environmental areas (digital). The sidebar on this Web page provides links to key topics, including environmental assistance, environmental education, environmental emergencies, environmental incentives, environmental reports, grants and loans, laboratory services, laws &amp; rules, permits, pollutants and toxicants, publications, and locations of environmental interest.</li> </ul> |
| Multiple Media | <ul style="list-style-type: none"> <li>• MiDNR—Articles on Lake Superior provide information on the <a href="#">Lake Superior Basin</a>, and <a href="#">Exciting Discoveries on Lake Superior</a>.</li> </ul>   |
| Multiple Media | <ul style="list-style-type: none"> <li>• <a href="#">The Nature Conservancy in Michigan</a>. Information on protected places (a list of 17 preserves and reserves plus ten partnership projects), ways of giving, how to volunteer, conservation science, about Michigan.</li> </ul>   |

| Resource               | Information Source   |
|------------------------|--|
| Plants                 | <ul style="list-style-type: none"> <li>• <a href="#">Online Atlas of Michigan Plants</a>. Provides online county-level maps and distribution data for the approximately 2,800 species of native and naturalized ferns, fern allies, gymnosperms, and angiosperms of Michigan and enables retrieval of lists of counties where user specified species occur.</li> </ul>   |
| Plants, Animals, Water | <ul style="list-style-type: none"> <li>• <a href="#">MiDNR—Forests, Land &amp; Water</a> <ul style="list-style-type: none"> <li>– Forest Management: information on forest management (biodiversity, boundaries, business and industry, MiDNR planning, fire management, forest health, private forest lands, state forest planning, state lands urban and community forestry), Draft 2006 State Forest Management Plan, Forest, Management Units, Michigan’s Growing and Expanding Forest Resource</li> <li>– Land Management: information on land management (management of forests, mineral exploration and development, easements for public utilities and oil &amp; gas pipelines, natural gas storage, agricultural and other special land uses, land acquisition and disposal, management and maintenance for soil and water quality, threatened and endangered species, and other special forest values), as well as information on best management practices, boundaries, Clean Michigan Initiative, conservation &amp; restoration, minerals, natural areas, natural roads, oil &amp; gas, and park stewardship</li> <li>– Water Management: information on dams and dam removal, inland lake maps, natural rivers.</li> </ul> </li> </ul> |
| Plants, Animals        | <ul style="list-style-type: none"> <li>• Gap Analysis Program (GAP) data for Michigan. The <a href="#">Final GAP Report</a> is available online, as are <a href="#">GAP data sets</a>, which provide information on land cover types and the distribution of animals affiliated with the land cover types.</li> </ul>  |
| Plants, Animals        | <ul style="list-style-type: none"> <li>• <a href="#">MiDNR—Protection of Threatened Species</a>. Links are provided to an overview of threatened/endangered species and information on working with endangered species, as well as to special species lists (Michigan’s Official List of Endangered and Threatened Species, Michigan’s Special Animals, Michigan’s Special Plants, and County Element Lists), and related resources.</li> </ul>  |
| Plants, Animals        | <ul style="list-style-type: none"> <li>• <a href="#">MiDNR—Wildlife &amp; Habitat</a>. Information on Michigan watchable wildlife viewing, herp atlas, keeping common species common, creating wildlife habitat, forests, the trees in your backyard, fire management, ecosystem management, natural areas, natural rivers, natural beauty roads, old growth and biodiversity stewardship, park stewardship, fire management, forests and minerals contact information,</li> </ul>   |

| Resource   | Information Source  |
|--|---|
| Plants, Animals—<br>Special Concern<br>Plants, Animals—<br>Special Concern | wildlife offices, wildlife management units, state game or wildlife areas.<br><ul style="list-style-type: none"> <li>• <a href="#">USFWS Endangered Species in Michigan</a>. County of occurrence identified for each Federally listed species.</li> <li>• <a href="#">USFWS TESS—Michigan. State-listed threatened/endangered species in Michigan; other special species lists</a>, including lists of <a href="#">county elements</a> (species and natural communities).</li> </ul>   |
| Socioeconomics   | <ul style="list-style-type: none"> <li>• <a href="#">MiDNR—Recreation &amp; Camping</a>. Information on recreational use, including map of parks, forests, and trails; characteristics of parks and forest campgrounds; campsite amenities; cross-country groomed ski pathways; fishing in parks; winter camping.</li> </ul>  |
| Socioeconomics   | <ul style="list-style-type: none"> <li>• <a href="#">U.S. Census Bureau, State &amp; County QuickFacts—Michigan</a>. Provides Michigan and nationwide quick facts on population, ethnicity, education, housing, and business ownership from most current census data. Also provides similar data for individual Michigan counties and cities.</li> </ul>  |
| Water  | <ul style="list-style-type: none"> <li>• <a href="#">Michigan Water Science Center, Michigan Hydrologic Summary</a>. Provides links to Michigan drought watch, Michigan flood watch, national water conditions—Michigan, national water conditions—other states, monthly bulletin of Great Lakes water levels, a summary of 1988-89 floods and droughts for Michigan (Michigan floods and droughts, general climatology, major floods and droughts, floods, droughts, water management, and references), and to weather sites (national weather service, interactive weather information network, current weather).</li> </ul>  |
| Water  | <ul style="list-style-type: none"> <li>• <a href="#">USGS Water Resources of the United States—Michigan</a>. Links to Michigan Water Science Center programs/projects (statewide water resources monitoring, protection of drinking water sources, effects of land use on water quality, effects of land use change on surface water flow, restoring natural flow regimes, water availability, Great Lakes issues, research and technical assistance at contaminated sites, technical assistance and support to USGS national programs) and water data (USGS water resources of the United States, USGS water resources of Michigan, real-time data for Michigan, site information for Michigan, surface-water data for Michigan, ground-water data for Michigan, water quality data for Michigan), Michigan hydrologic summary, Federal-state cooperator program, USGS maps &amp; publications, “Ask USGS”, and information about a featured project.</li> </ul> |

