

ARCELORMITTAL 2011
Wild Rice Report

Prepared for
ArcelorMittal

December 29, 2011



Technical Memorandum

To: Jaime Baggenstoss, ArcelorMittal Minorca Mine Inc.
From: Rachel Walker, Kevin Menken, Barr Engineering Company
Subject: 2011 Wild Rice Field Survey for ArcelorMittal
Date: December 29, 2011
Project: 23/69-1115.01

The Minnesota Pollution Control Agency (MPCA) sent correspondence dated March 28, 2011 (Attachment A) to ArcelorMittal Minorca Mine (ArcelorMittal) requesting that a literature review and field survey be conducted for the receiving waters located downstream of permitted discharges from the Minorca Plant and Tailings Basin and the Laurentian and East Reserve Mine Areas as follows (Study Area):

ArcelorMittal – Minorca Plant and Tailings Basin (NPDES/SDS Permit No. MN0055964)

- Outfall SD001: Wouri Creek to Sand River to the confluence with Pike River
- Outfall SD003: Laurentian Creek to Sand River to the confluence with Wouri Creek

ArcelorMittal – Laurentian and East Reserve Mine Areas (NPDES/SDS Permit No. MN0059633)

- Outfall SD001, SD002 and SD003: Laurentian Mine discharges to White Lake to an unnamed creek (referred in the permit as the “Central Discharge Route”) to the confluence with the Embarrass River – SD003 is the only active discharge
- Outfall SD005: East Reserve Mine discharge to the Central Discharge Route to the confluence with the Embarrass River

A literature review and wild rice survey has been conducted to comply with the MPCA’s letter of request. Figure 1 identifies the receiving water bodies, in yellow, that comprise the Study Area used for the literature review and field survey. This memorandum includes discussion of the methodology and results of the literature review and wild rice survey. Results are summarized in Table 1.

Table 1 Summary of Wild Rice Literature Review and 2011 Field Survey Findings

Water Body	Wild Rice Presence Indicated in Literature Review?	Wild Rice Identified in 2011 Field Survey?	Sulfate Concentration (mg/L)	Field Survey Observations
NPDES/SDS Permit No. MN0055694				
Laurentian Creek	No	No	Not Sampled	No evidence of wild rice. Channel characteristics: narrow with variable water depth (<1 foot to >3 feet) and mucky, sandy, rocky substrate.
Wouri Creek	No	No	Not Sampled	No evidence of wild rice. Channel characteristics: narrow with variable water depth (< 1 foot to > 3 feet) and mucky substrate.
Sand River	Yes	Yes	19.9 - 30.4	One density "1" stand of wild rice at Mile 3.8. Channel characteristics: narrow with variable water depth (<1 foot to >3 feet) and sandy, gravelly, rocky substrate; continuous density "4" and "5" stands from Mile 7.0 to 10.1. Channel characteristics: wider channel with variable water depths (<1 foot to >3 feet) and soft, mucky substrate.
NPDES/SDS Permit No. MN0055633				
White Lake	No	Yes	123	Density "1" stands of wild rice identified in several near-shore areas. Water depth at wild rice stands 1-2 feet. Substrate firm; fine sediments to gravelly/sandy in places.
Unnamed Creek	No	No	Not Sampled	No evidence of wild rice. Channel characteristics: narrow with variable water depth (<1 foot to > 3 feet) and sandy, gravelly, and cobble substrate with intermittent patches of mucky substrate.

Wild Rice Literature Review

Barr reviewed publicly available documents containing information on the presence and absence of wild rice (*Zizania palustris* L.) in the Study Area. Local DNR Fisheries offices in Minnesota store new and historical records that are relative to the surface waters that are present within their management zones and carries out lake surveys for most lakes in Minnesota every few years. The files located at the DNR Fisheries office located in Tower, Minnesota were reviewed for information on the presence of wild rice in the Study Area.

Other reports and resources by various agencies and organizations were also downloaded from digital or internet sources. These include: Investigational Report #22. Moyle. 1941. *Report on Minnesota Wild Rice for 1940.* Bureau of Fisheries Research, Division of Game and Fish, 2008 Natural Wild Rice in Minnesota Report – DNR, 2009 Wild Rice Resource Guide (3rd Ed.) – 1854 Treaty Authority, 2010 Wild Rice Management Workgroup’s “350 Significant Wild Rice Waters in Minnesota.”

The results of file reviews and available information relative to the presence of wild rice in the Study Area are provided below.

Minorca Plant and Tailings Basin Study Area (SD001 and SD003 - NPDES/SDS Permit No. MN0055694)

Laurentian Creek

The headwaters of Laurentian Creek is near the location of SD003 (NPDES/SDS Permit No. MN0055694). A DNR Fisheries file includes a brief memorandum titled “The Status of Laurentian Creek in Relation to the Proposed Inland Steel Taconite Plant” (28 Nov 1973) that documents, among other things, the aquatic vegetation of Laurentian Creek. Wild rice was not among the listed species. No additional information was referenced.

Wouri Creek

The headwaters of Wouri Creek is at the Upland Tailings Basin at the location of SD001 (NPDES/SDS Permit No. MN0055694). A DNR Fisheries file includes a brief memorandum titled “The Status of Wouri Creek in Relation to the Proposed Inland Steel Taconite Plant” (28 Nov 1973). Aquatic vegetation was documented in the memo; wild rice was not among the listed species. No additional information was referenced.

Sand River

The headwaters of the Sand River is located at the U. S. Steel Minntac tailings basin facility. No files were found for Sand River, which is the receiving water of Laurentian and Wouri Creeks.

Laurentian and East Reserve Mining Areas (SD003 and SD005 - NPDES/SDS Permit No. MN0059633)

White Lake

A DNR Fisheries file includes a Lake Survey Summary, dated 17 Jul 1987. The aquatic vegetation of the lake was included in the summary; wild rice was not among the listed species. White Lake receives water (via an unnamed tributary) from the Outfall SD003 (NPDES/SDS Permit # MN0059633) and is connected to the Embarrass River via an unnamed tributary to an unnamed creek (Central Discharge Route).

Unnamed Creek

Files for numerous water bodies called “Unnamed Creek” were reviewed. None of the files corresponded to the unnamed creek (Central Discharge Route) in the Study Area.

Unnamed Tributary

No files regarding water bodies called “Unnamed Tributary” were identified.

Regional Resource Documents

Wild rice investigational reports with regional or statewide significance were also reviewed. Many of the documents had no information regarding wild rice within the Study Area. Those with information include:

- Investigational Report #22. Moyle. 1941. *Report on Minnesota Wild Rice for 1940*. Bureau of Fisheries Research, Division of Game and Fish
None of the Study Area waters were listed in this report as a wild rice resource.
- Investigational Report #40. Moyle. 1942. *The 1941 Minnesota Wild Rice Crop*. Bureau of Fisheries Research Division of Game and Fish
None of the Study Area waters were listed in this report as a wild rice resource.
- 2008 Natural Wild Rice in Minnesota Report – DNR
None of the Study Area waters were listed in this report as a wild rice resource.
- 2009 Wild Rice Resource Guide (3rd Ed.) – 1854 Treaty Authority.
Of the Study Area waters, only the Sand River was listed as a present or historic wild rice resource. The list was updated on 25 Feb 2009. No further information was given.
- 2010 Wild Rice Management Workgroup’s “350 Significant Wild Rice Waters in Minnesota”
- Of the Study Area waters, only the Sand River was listed as a wild rice resource. This document includes no information regarding wild rice on the Sand River.
- Trygg, J.W.M. 1907-1858. Composite Map of United States Land Surveyors’ Original Plats and Field Notes. Map Sheet No. 18.

The Trygg maps are historical survey maps created from land surveys dated 1858-1907 as well as other resources from the early to mid-1800s. J. Trygg published a compilation of these map resources in 1966. They are commonly referred to as Trygg maps. Items included on the map include wetlands, lakes, streams, forests, trails, roads, settlements, fields, mill sites, and other local features. Wild rice is not specifically included on the map, but indications of cultural resources and “Indian Trails” near water bodies may suggest the historical presence of wild rice. According to Trygg Map No. 18 (1966), an Indian Trail originates northwest of Sand Lake and merges into Laurentian Creek. Another Indian Trail originates from what is called Wild Rice Lake, now referred to as Big Rice Lake (Lake ID 69066900) according to NHD data. The Trail merges into the north side of Laurentian Creek. A Portage Trail is identified as also originating from

Wild Rice Lake and merges into the Sand River from the north. South of Laurentian Creek, an Indian Trail runs southwest from two small water bodies that were located in 1881 at the confluence of the Sand River and Laurentian Creek (Figure 1).

Literature Review Findings

A review of regional resource documents and DNR Fisheries files indicates that Sand River is the only water body in the Study Area that includes observations of wild rice; no records documented the presence of wild rice in Wouri Creek, Laurentian Creek, White Lake, Unnamed Creek, or Unnamed Tributary.

2011 Wild Rice Field Survey

On August 17, 18, 19, 25, and 31, 2011, Barr conducted a field survey of the Study Area water bodies indicated on Figure 1. Details of the 2011 wild rice field survey methodology and findings are below.

Methodology

The purpose of the qualitative survey and water quality sampling was to document the presence or absence of wild rice and its relative stand density, as well as to take surface water samples in or near wild rice stands. Methods of survey include the 1854 Treaty Authority, “Wild Rice Monitoring and Abundance in the 1854 Ceded Territory (1998 – 2008)” and other vegetation plot data surveys designed to quantify *in situ* plant species (e.g., *A Handbook for Collecting Vegetation Plot Data in Minnesota: The Relevé Method* (Minnesota Department of Natural Resources, 2007)).

A wild rice density rating used by the 1854 Treaty Authority, on a scale of 1 to 5, was applied to each observation of wild rice. The density rating was used to qualitatively assess the density of wild rice over a given area, and relates to the approximate percent coverage of wild rice (as listed in Table 2 and shown by example in Attachment B). As discussed above, the same method was used by the 1854 Treaty Authority.

Table 2 Wild Rice Density Scale

Wild Rice Density Rating	Description
1	<10% Wild Rice Coverage
2	10 – 25 % Wild Rice Coverage
3	25 – 50 % Wild Rice Coverage
4	50 – 75% Wild Rice Coverage
5	>75% Wild Rice Coverage

The 1854 Treaty Authority only surveyed known wild rice water bodies and did not include reconnaissance of small stream systems.

Where accessible, every stream section in the Study Area was surveyed by kayak or on foot. Some of the stream reaches were not navigable by kayak or difficult to access on foot due to the physical

characteristics of the habitat. The characteristics that limited physical access to certain stream sections are also characteristics that limit the suitability of habitat for wild rice growth. These characteristics include very low water levels (less than 1 foot); predominantly rocky substrate; narrow channel conditions with little to no open water often due to thick vegetation growth (*Typha* sp., *Sagittaria* spp., *Sparganium* spp.); channel morphology; and dense overhanging vegetation (*Phalaris arundinacea*). Wild rice typically grows in open water with direct sunlight. Other conditions that favor wild rice growth include some flowing water (water bodies with an inlet and an outlet), water depths ranging from 1 to 4 feet, and predominantly mucky substrate. Stream reaches that were not navigable by kayak or difficult to access by foot were surveyed by consulting FSA 2010 aerial photographs (1-meter resolution) and by observing stream conditions at available road crossings, as described below. Macrophytes identified growing next to or amidst wild rice stands are listed in Attachment C. Water samples were sent to Pace Analytical Laboratory in Virginia, Minnesota and were analyzed for sulfate.

Wild Rice Field Survey Findings

Minorca Plant and Tailings Basin (NPDES/SDS Permit No. MN0055694)

Wild rice was not identified in Laurentian Creek or Wouri Creek. Wild rice was identified on Sand River. Figure 2 identifies the sections of Laurentian Creek, Wouri Creek, and the Sand River that were surveyed on foot or by kayak in 2011. Locations where wild rice was identified on Sand River are also shown on Figure 2, and are described below. Photographs from the field survey are included as Attachment D.

Laurentian Creek

No wild rice was identified on Laurentian Creek (Figure 2). Due to its narrow channel, mucky, sandy and rocky substrate, low water levels, and dense vegetation, the creek was unnavigable by kayak. The creek was surveyed on foot where possible, and aerial photographs were examined for sections that were not surveyed in the field. Mile 0.8 to 1.0, 2.1 to 2.5, and 3.2 to 3.5 were surveyed by foot. Aerial photos were examined along stream stretches unnavigable by kayak or foot (Mile 0.0 to 0.8, 1.0 to 2.1, and 2.5 to 3.2).

Where Laurentian Creek could be surveyed on the ground, the creek was often characterized by a narrow, incised channel with dense reed canary grass (*Phalaris arundinacea*) growing on its banks. From mile 4.5 to its confluence with Sand River, the creek is not visible in aerial photographs as it passes through a forested wetland. Wild rice typically grows in open water with direct sunlight; therefore, a stream channel that is not visible in aerial photographs would not be expected to support wild rice.

Wouri Creek

No wild rice was identified on Wouri Creek (Figure 2). The creek was too shallow and narrow to survey by kayak and was therefore surveyed by foot. Mile 0.0 to 0.2 was surveyed from the road at the base of the tailings basin due the presence of dense cattails (*Typha* sp.). Mile 0.2 to 1.3 was not surveyed by foot or kayak due to the presence of dense reed canary grass, cattails, and mucky

sediment; therefore, aerial photographs were examined. Mile 1.3 to 1.8 was surveyed on foot. Lily pads (*Nuphar* sp.) were common near Mile 1.8. Mile 1.8 to 2.5 was not surveyed by kayak or foot due to mucky sediment and low water levels. Aerial photographs were examined. Mile 2.5 to 2.6 of Wouri Creek, at the confluence with Sand River, was surveyed by kayak paddling upstream from Sand River.

Sand River

Wild rice was identified in several locations along Sand River as indicated on Figure 2. The entire river reach was surveyed by kayak. No wild rice was identified from Mile 0.0 to 3.8. At Mile 3.8, one stand of wild rice, density “1” was identified (Figure 2 and Photograph 6 in Attachment D). No wild rice was identified from Mile 3.8 to 7.0. From Mile 0.0 to 7.0, the river bed comprised firm sand, gravel and rock. It was narrow and shallow. Lily pads (*Nuphar* sp.), pondweed (*Potamogeton* sp.), arrowheads (*Sagittaria* sp.), and bur-reed (*Sparganium* sp.) were commonly found from Mile 0.0 to 7.0.

From Mile 7.0 to 10.1 on the Sand River, extensive beds of wild rice, density “4” and “5,” were identified growing in water up to 1- meter deep (Figure 2 and Photographs 8 & 9 in Attachment D). The river bed comprised soft, mucky sediment and was wider and deeper than in previous miles. Pondweed (*Potamogeton* sp.) and lily pads (*Nuphar* sp.) were commonly found growing amongst and next to wild rice stands.

Water samples were collected and analyzed for sulfate at several locations where wild rice was present on the Sand River (Figure 2). Concentrations of sulfate in Sand River ranged from 19.9 to 30.4 mg/L (Table 3). The concentration of sulfate at the density “1” stand of wild rice at Mile 3.8 was 30.4 mg/L. The concentration of sulfate at Mile 7.0 with continuous stands of wild rice of density “4” to “5” was 24.2 mg/L. At Mile 10.1 with continuous stands of wild rice, density “4” to “5”, the sulfate concentration was 19.9 mg/L.

Table 3 Sand River Sulfate Concentrations

Sample ID	Sample Date	Sulfate Concentration (mg/L)	Wild Rice Density and Substrate
AM-SR-KDM-01	8/19/2011	30.4	Density “1”, narrow channel, water depth is 2.2 feet; substrate is soft and mucky.
AM-SR-KDM-02	8/25/2011	24.2	Density “4” and “5”, wider channel with wild rice growing in water depths ranging from a few inches to 1.3 feet; soft, mucky substrate.
AM-SR-KDM-03	8/25/2011	19.9	Density “4” and “5”, wider channel with wild rice growing in up to 3 feet water depth; soft, mucky substrate.

Laurentian and East Reserve Mining Areas (NPDES/SDS Permit No. MN0059633)

No wild rice was identified in Unnamed Creek. Stands of wild rice with a density rating of “1” were identified in White Lake (a headwater to Unnamed Creek). Details of the field survey of White Lake and Unnamed Creek are shown on Figure 3 and are discussed below.

White Lake

Several stands of wild rice were identified on White Lake (Figure 3). Each stand of wild rice was classified as having a density of “1”, and consisted of approximately a few dozen wild rice plants growing in shallow areas near shore (Photographs 10 & 11, Attachment D). White water lily (*Nymphaea odorata*) and dense growth of bladderwort (*Utricularia* sp.) were also present. Water samples were collected near wild rice beds at two locations and analyzed for sulfate (Figure 3). The sulfate concentration was 123 mg/L at both sample locations (Table 4).

Table 4 White Lake Sulfate Concentrations

Sample ID	Sample Date	Sulfate Concentration (mg/L)	Wild Rice Density and Substrate
AM-WL-KDM-01	8/18/2011	123	Density “1”, wild rice growing in 2 feet water depth, substrate gravelly/sandy.
AM-WL-KDM-02	8/18/2011	123	Density “1”, wild rice growing in 1 foot water depth, substrate was firm silt and muck.

Unnamed Creek (Central Discharge Route)

No wild rice was identified on Unnamed Creek. The creek was surveyed from its headwaters at White Lake (identified as Unnamed Tributary on Figure 3) near the McKinley Pit discharge location (SW001 - NPDES/SDS Permit # MN0059633), downstream to its confluence with the Embarrass River (approximately Mile 5.0, Figure 3). Due to its narrow channel, low water levels, and dense vegetation (predominantly reed canary grass (*Phalaris arundinacea*)), the creek was unnavigable by kayak. Miles 0.0 to 0.9, 1.2 to 2.5, 3.3 to 4.0, and 4.6 to its confluence with the Embarrass River were surveyed by foot. Miles 0.9 to 1.2, 2.5 to 3.3, and 4.0 to 4.6 were surveyed by consulting aerial photographs. The majority of the creek sections surveyed by foot had firm substrate that consisted of sand, gravel, and cobble. Soft, mucky sediment was also intermittently encountered. At Mile 0.0, Unnamed Creek was dominated by dense stands of cattails (*Typha* sp.). Reed canary grass (*Phalaris arundinacea*) was dominant along the stream banks from Mile 1.2 to 4.0. From Mile 2.5 to 3.3, Unnamed Creek flowed through pasture with barbed-wire fencing crossing the channel and therefore was inaccessible by kayak or by foot. Mile 4.0 to 4.6 was composed of primarily rocky substrate with dense overhanging forest canopy. Intermittent stands of bur-reed (*Sparganium* sp.) and arrowhead (*Sagittaria* sp.) were identified in all sections surveyed by foot.

Conclusions

Wild rice was not identified on Wouri Creek (NPDES/SDS Permit No. MN 0055964) or Laurentian Creek (NPDES/SDS Permit No. MN 0055964). Extensive beds of wild rice with high density ratings were identified on a portion of the Sand River, which receives flow from Laurentian Creek and Wouri Creek. Sulfate concentrations in water samples collected adjacent to wild rice on the Sand River ranged from 19.9 to 30.4 mg/L.

Several low density stands of wild rice were identified in White Lake, a headwater of Unnamed Creek/Central Discharge Route (NPDES/SDS Permit No. MN0055933). The sulfate concentration in White Lake was 123 mg/L. Wild rice was not identified in Unnamed Creek or the Unnamed Tributary that connects White Lake to Unnamed Creek (NPDES/SDS Permit No. MN0055933).

Figures



Barr Footer: ArcGIS 10.0, 2011-12-28 15:46 File: I:\Client\ArcelorMittal\Work Orders\Out of Scope Maps\Wild Rice\Figure 1 Wild Rice Study Area.mxd User: am2

- ⊕ Active Outfall
- ⊕ Future/Inactive Outfall
- Surface Water Monitoring Location
- Study Area Water Bodies
- - Indian Trail (Trygg, 1966)

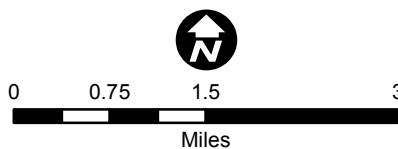
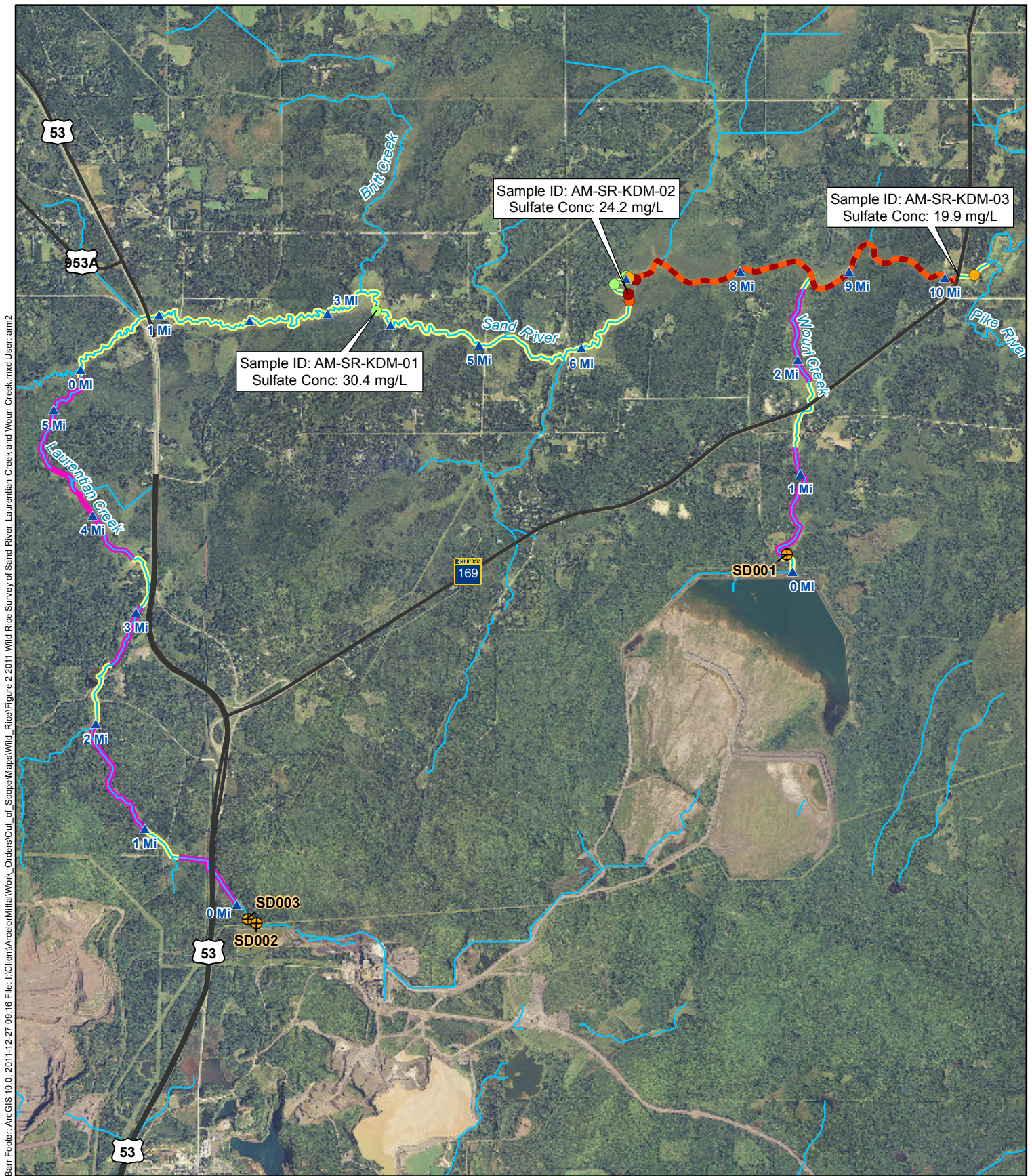


Figure 1
WILD RICE STUDY AREA
ArcelorMittal Facilities
St. Louis County, MN



Wild Rice Density

- 1 <10% Wild Rice Coverage
- 2 10 - 25% Wild Rice Coverage
- 3 25 - 50% Wild Rice Coverage
- 4 50 - 75% Wild Rice Coverage
- 5 >75% Wild Rice Coverage
- Continuous stand of wild rice of density 4 to 5.

- ▲ River Miles
- Active Outfall
- Streams Surveyed in 2011
- Stream Segments Not Surveyed in 2011

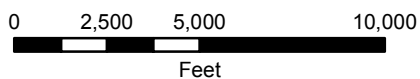


Figure 2
2011 WILD RICE SURVEY OF
SAND RIVER, LAURENTIAN CREEK
AND WOURI CREEK
ArcelorMittal Minorca Mine
& Tailings Basin
St. Louis County, MN

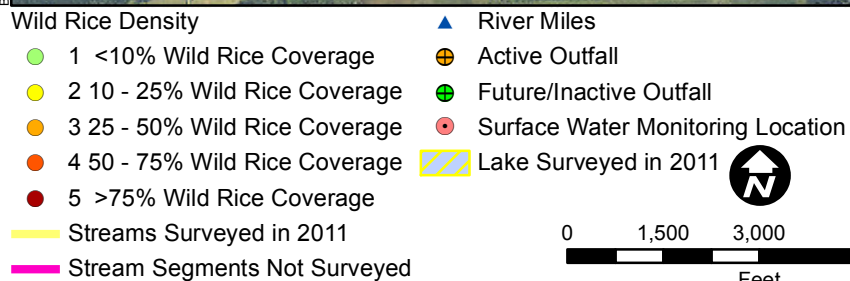
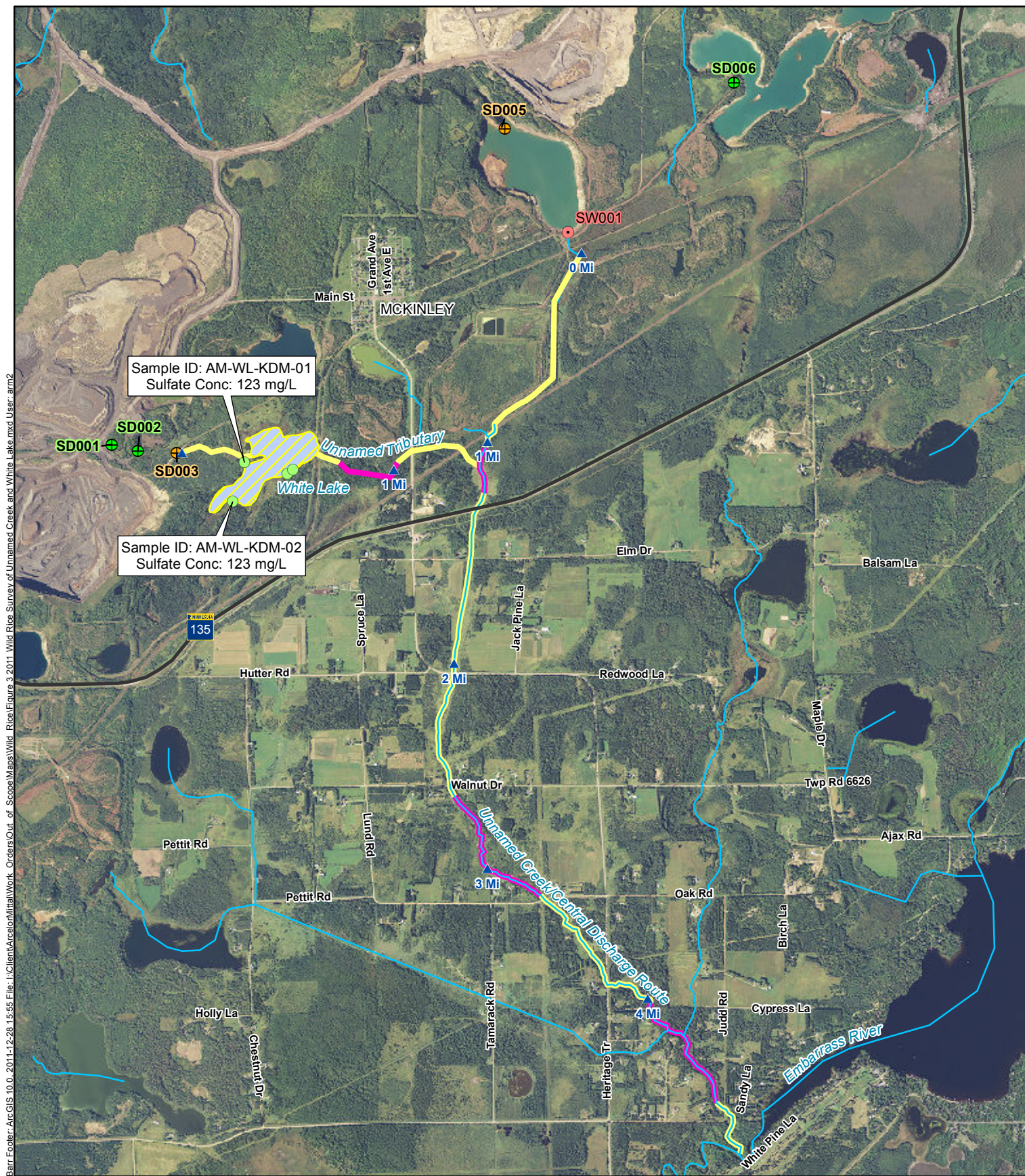


Figure 3
2011 WILD RICE SURVEY OF
UNNAMED CREEK AND WHITE LAKE
Laurentian & East Reserve Mining Areas
St. Louis County, MN

Attachments

Attachment A

**Minnesota Pollution Control Agency Correspondence Dated March 28,
2011**



Minnesota Pollution Control Agency

520 Lafayette Road North | St. Paul, MN 55155-4194 | 651-296-6300 | 800-657-3864 | 651-282-5332 TTY | www.pca.state.mn.us

March 28, 2011

Ms. Jamie Baggenstoss, Environmental Engineer
ArcelorMittal Minorca Mine
5950 Old Highway 53 – P.O. Box 1
Virginia, MN 55792

RE: NPDES/SDS Permit No. MN0059633
NPDES/SDS Permit No. MN0055964
Request for Information on Wild Rice

Dear Ms. Baggenstoss:

The Minnesota Pollution Control Agency (MPCA) will soon begin the process of reissuing the ArcelorMittal – Minorca Mine – Laurentian (MN0059633) and the ArcelorMittal – Minorca mine Minorca (MN0055964) NPDES/SDS permits. One of the goals of the MPCA is to protect surface waters used for the production of wild rice. Over the last several months, MPCA staff has been working to develop guidance to help determine, on a case-by-case basis, what waters of the state are “used for the production of wild rice” and subject to the 10 mg/L sulfate standard under Minn. R. 7050.0224, subp. 2. The discharges from the permitted Laurentian and Minorca facilities may have impacts to potential wild rice waters downstream of the discharges.

Due to the elevated levels of sulfates in the mine pit dewatering discharges, tailings basin discharge and plant site settling basin discharge, the MPCA is requesting the company to conduct a search for wild rice downstream of its discharge points and to gather additional information regarding wild rice downstream of its permitted discharge points. This information will be important for the permitting process to ensure that appropriate water quality standards are applied and to ensure that surface waters, including those used for the production of wild rice, are adequately protected.

We are requesting the company to survey the following receiving waters downstream of the permitted discharge areas for the presence of wild rice:

ArcelorMittal – Laurentian

The Agency currently has information from the PolyMet EIS studies where the company has surveyed the Embarrass River from Esquagama Lake to County Road 95. Although it is not required for this request, it may be in the company’s best interest to confirm these results.

- From the Laurentian Mine discharge to the “Central Discharge Route” to the confluence with the Embarrass River.
- From the East Reserve Mine discharge to the “Central Discharge Route” to the confluence with the Embarrass River.

Ms. Jamie Baggenstoss

Page 2

March 28, 2011

ArcelorMittal – Minorca

The Agency is aware of the presence of wild rice in the Pike River from previous studies conducted by Minntac. We are requesting the following receiving waters to be surveyed for the presence of wild rice:

- SD-001: Wouri Creek to the Sand River to the confluence with the Pike River.
- SD-003: Laurentian Creek to Sand River to the confluence with Wouri Creek.

The company should provide the following information to the MPCA:

1. A literature search for wild rice in the downstream receiving waters listed above potentially impacted by the discharges. Some data sources that may be used to determine the potential for wild rice impacts include Appendix A of the 2008 DNR Wild Rice Report, the most recent DNR Wild Rice Harvester Survey, and the 1854 Treaty Authority List. For waters listed in the DNR Wild Rice Report, Gary Drotts at 218-833-8620 and Ann Geisen at 218-833-8625 may be contacted to gather all the available Department of Natural Resources (DNR) data on those sites. Information on any active or proposed DNR management activities designed to establish, protect, or enhance the wild rice resources of these waters would be helpful.
2. A field survey to observe whether wild rice is actually present in all waters potentially impacted by the discharges that were determined to have potential for wild rice, either based on the literature search above or those that have characteristics which may encourage wild rice production. When the field survey is conducted, it should be conducted by a qualified professional and should take into account the cyclic nature of the growth of this aquatic plant.
3. The results of water quality monitoring for sulfate in the waters potentially impacted by the discharges in which wild rice is found to be present. The company should attempt to collect at least one grab sample in each water where wild rice is found to be present.

The wild rice literature search and field survey work should be conducted in 2011. The company may incorporate results from previous wild rice survey work that may have been done in the recent past as part of its submittal.

We appreciate your cooperation in this matter. If you have any questions regarding this request, please contact me at 651-757-2405 or by e-mail at stephanie.handeland@state.mn.us.

Sincerely,



Stephanie Handeland

Hydrologist

Land and Water Quality Permits Section

Industrial Division

SH:lmg

cc: John Thomas – MPCA Duluth Regional Office

Attachment B

Density Photographs

Density Level 1



Density Level 2



Density Level 3



Density Level 4



Density Level 5



Attachment B
Photographs Depicting Range of Wild
Rice Densities (1-5)

Attachment C

Common and Scientific Names of Plant Species

Common and Scientific Names of Plant Species

Arrowheads (*Sagittaria* sp.)

Bladderwort (*Utricularia* sp.)

Bur-reed (*Sparganium* sp.)

Cattails (*Typha* sp.)

Pond lily (*Nuphar* sp.)

Pondweed (*Potamogeton* sp.)

Reed canary grass (*Phalaris arundinacea*)

Sedges (*Carex* sp.)

White water lily (*Nymphaea odorata*)

Attachment D

Photographs from Field Survey

R0011305



Photograph 1. Laurentian Creek west of Hwy 53. No wild rice present.



Photograph 2. Laurentian Creek. No wild rice present.



Photograph 3. Wouri Creek. No wild rice present.



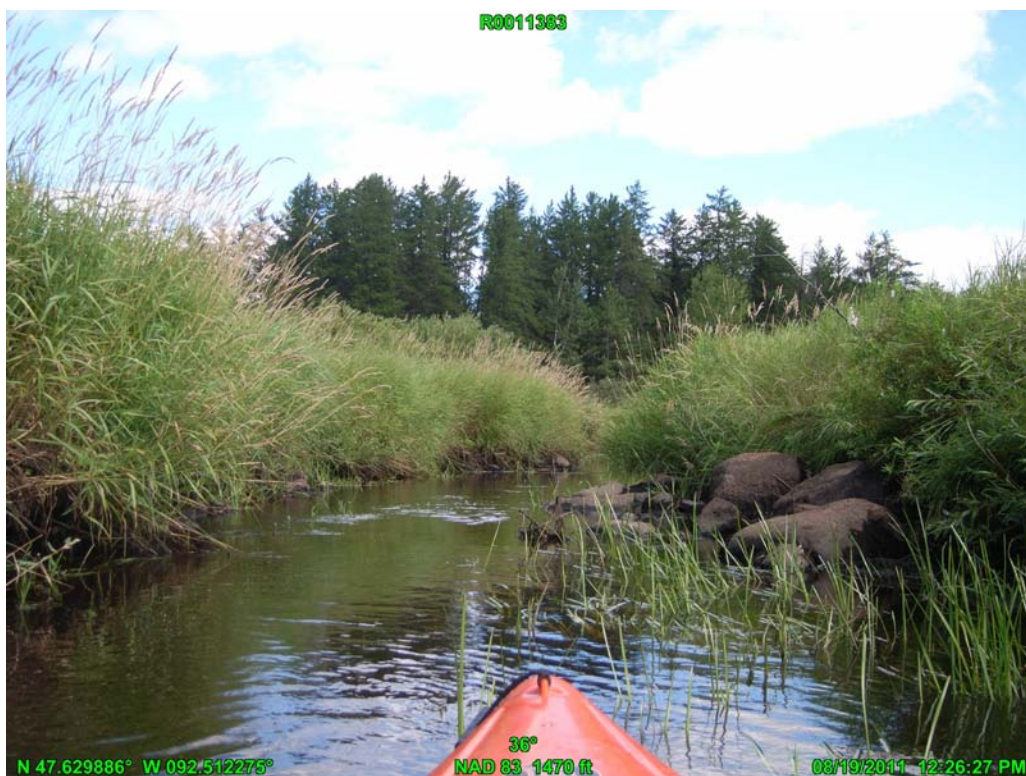
Photograph 4. Wouri Creek. No wild rice present.



Photograph 5. Beaver dam a few hundred yards upstream of Sand River confluence. No wild rice present.



Photograph 6. Wild Rice, Density "1", Sand River.



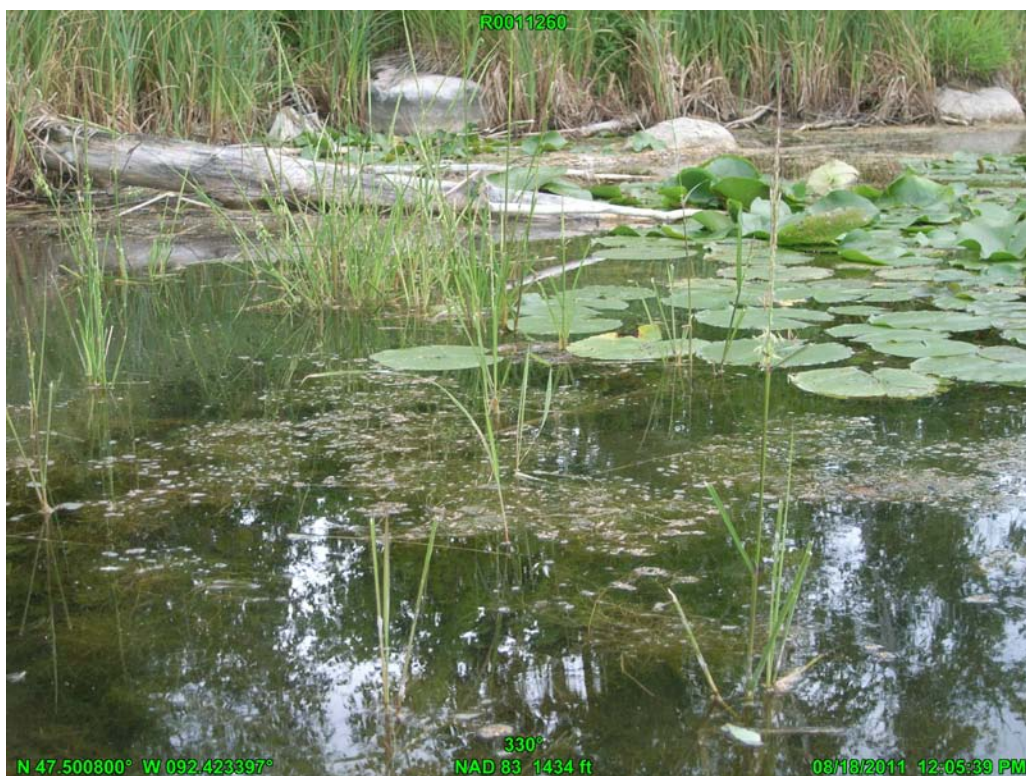
Photograph 7. Shallow, rocky section of Sand River. No wild rice present.



Photograph 8. Dense stand of wild rice, Sand River.



Photograph 9. Stands of wild rice, density “4”-“5”, along shorelines of wide stretch of Sand River.



Photograph 10. Wild rice, density “1”, near shoreline of White Lake.



Photograph 11. Scattered wild rice among lily pads and dense bladderwort, White Lake.



Photograph 12. Unnamed Creek. No wild rice present.



Photograph 13. Unnamed Creek. No wild rice present.