SANDY FALLS GENERATING STATIONS
MATTAGAMI RIVER
FISHERIES IMPACT ASSESSMENT
2006

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1.0 INTRODUCTION

C. Portt and Associates was retained, as part of the SENES Consultants Limited project team, by Ontario Power Generation Inc. (OPG) to conduct a fisheries impact assessment of the proposed Sandy Falls Generating Station (GS) redevelopment. The Sandy Falls GS is located approximately 7 kilometres (km) west of the Timmins city centre on the Mattagami River (Figure 1). This report presents the results of the fisheries impact assessment, that is based upon investigations of aquatic habitat and the fish community at the Sandy Falls GS in 2005 and 2006, as well as the proposed redevelopment works.

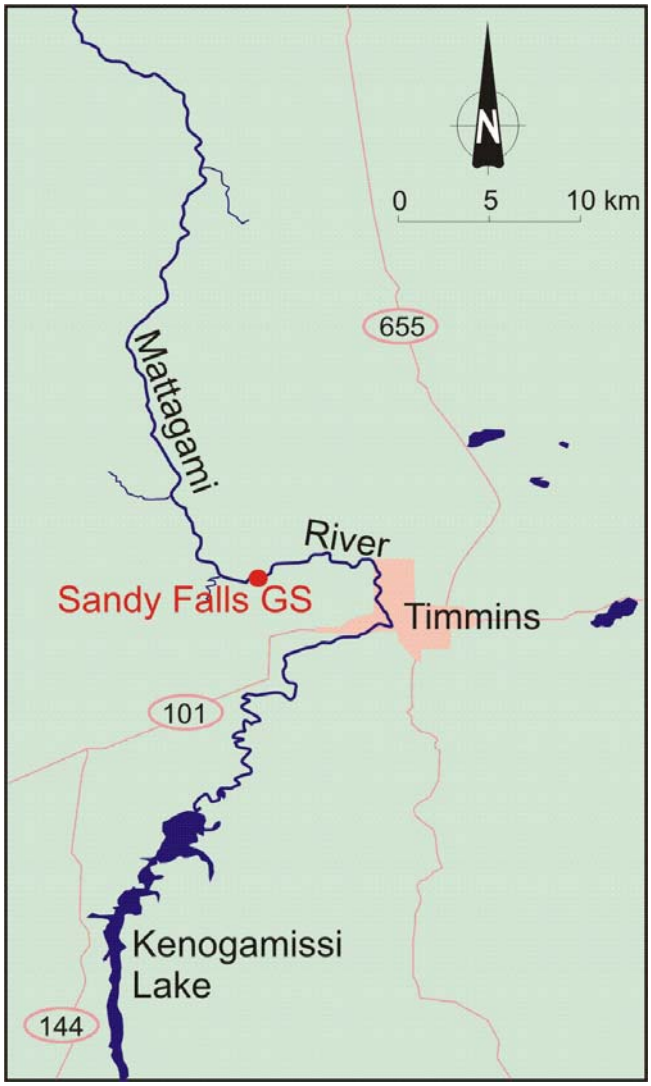


Figure 1: Location of the Sandy Falls GS on the Mattagami River near Timmins, Ontario.

2.0 METHODS

The results of investigations of the existing fisheries at the Sandy Falls GS (C. Portt and Associates, 2006a; 2006b; 2006c) were used in conjunction with information provided by OPG regarding the proposed GS expansion project to assess the potential impact of the project on the fisheries resources that utilize the Sandy Falls GS site.

An additional fish collection was conducted by C. Portt and Associates staff (G. Coker, J. Reid) on June 21, 2006. Fish were collected by electrofishing in wadeable areas along the shore of the riffles that extend downstream of the tailrace using a Halltech Model HT 2000 backpack electrofisher. At this time the habitat was checked for any gross changes that might have occurred since the detailed habitat characterization in June 2005.

3.0 RESULTS OF JUNE 21, 2006 FIELD INVESTIGATION

The fish collected by electrofishing were 24 young-of-the-year (YOY) suckers (*Catostomus* sp.), 12 logperch (*Percina caprodes*), 1 spottail shiner (*Notropis hudsonius*), 2 juvenile burbot (*Lota lota*), 2 mottled sculpin (*Cottus bairdii*), 2 longnose dace (*Rhinichthys, cataractae*), 2 mimic shiners (*Notropis volucellus*), and 2 brassy minnows (*Hybognathus hankinsoni*). Mottled sculpin, burbot and longnose dace, were also captured during the previous year's electrofishing on June 8, 2005; the other species were not.

Both longnose and white suckers spawn within the study area (C. Portt and Associates 2006a,c), and the YOY suckers probably originate from local spawning. Logperch and longnose dace are typical residents of riffle areas, and mottled sculpin are often found among coarse substrates, regardless of water velocity. Similarly, young burbot often occupy the interstitial spaces along cobble or rip rap shores (Scott and Crossman, 1973; G. Coker, personal observation). The remaining fishes are expected to be present throughout the various habitats downstream of the Sandy Falls dam, but likely in greater numbers in quieter water.

No significant changes in habitat from June, 2005, were apparent.

4.0 POTENTIAL IMPACTS TO FISH HABITAT

4.1 Generating station redevelopment

The existing three unit Sandy Falls GS, with a maximum output of 3.0 megawatts, will be replaced by a new single unit GS with a maximum output of approximately 5.5 megawatts. Instead of penstocks, which are currently used, the proposed GS will utilize an intake canal to deliver water from the existing dam to the powerhouse (Figure 2). Though the new canal and GS will not occupy the same location as the existing penstocks and GS, the intake structure will remain at the same location, but will be enlarged. The new tailrace will discharge adjacent to the existing tailrace and will be orientated such that it discharges into the same area as the existing tailrace (Figure 2). The existing GS will be decommissioned and demolished, and the existing penstocks will be removed and/or buried in-place. The unused section of the existing tailrace will be retained to provide fish habitat.

Mitigation

- In-water construction activities should be timed to avoid the spawning and incubation period of spring spawning fishes such as walleye (*Sander vitreus*) and suckers (Catostomidae), which typically excludes in-water work from April 1 to June 15.
- Dredged material should be disposed of on land above the high water level and suitably contained/stabilized to prevent the dredged material from re-entering the water.
- Sediment and erosion control measures should be implemented as required prior to work and maintained during the work phase, to prevent entry of sediment into the water. This should include sediment removal from water pumped from within cofferdam enclosures.

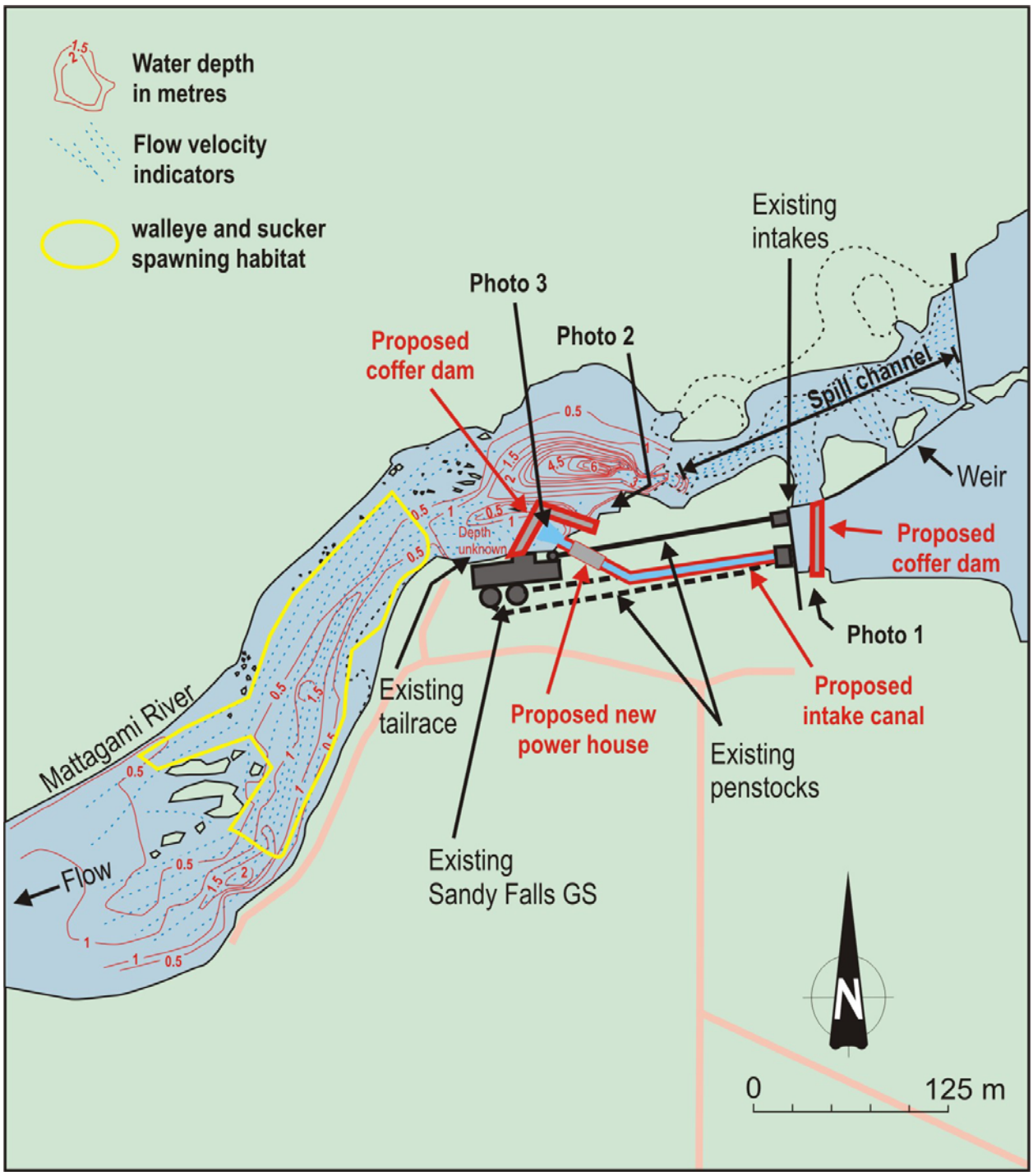


Figure 2: Detail of the study area in the vicinity of the Sandy Falls GS, showing the proposed redevelopment works, photograph locations, water depths, and the area of walleye and sucker spawning habitat. Note that the blue velocity indicators denote faster water when close together, and slower water when more widely spaced.

- All materials and equipment used for the purpose of site preparation and project completion should be operated and stored in a manner that prevents any deleterious substance (e.g. petroleum products, debris etc.) from entering the water.
- The floor of the new tailrace and any area of the exiting riverbed that is re-contoured to expose bedrock, should be covered by a layer of cobble-sized material to provide better habitat.

Assessed impact

Refurbishment and increasing the capacity of the intake structure will not result in any permanent alterations to fish habitat. A section of the existing riverbank will be removed to accommodate the width of the proposed tailrace, and the riverbed will require re-contouring to smooth the transition between the new tailrace and the existing riverbed. Some of the riverbed re-contouring will likely occur within the existing tailrace, and though the extent of any re-contouring is presently unknown, it will extend, at a maximum, approximately 20 metres (m) offshore and be approximately 14 m wide. The tailrace area and adjacent riverbed that will be altered is not thought to be critical habitat; most of this area has substrate of exposed bedrock or exposed bedrock overlain with a relatively thin layer of coarse granular material. However, the cobble shoals that have developed along the lip of the existing tailrace likely provide good general habitat for smaller fishes and invertebrates, and for foraging larger fishes. The cobble shoal material is expected to re-sort into similar deposits relative to the new tailrace configuration, resulting in an alteration of habitat, but not a habitat loss or a reduction in habitat productivity. Provided that the recommended mitigation measures are implemented, the net impact to fisheries production from direct habitat alterations will be negligible.

4.2 Temporary construction impacts

Temporary impacts to fish habitat will occur due to the placement of cofferdams and the dewatering of habitat within those cofferdams. A cofferdam is required at the intake structure to dewater approximately 870 m^2 (0.087 hectares) of the Mattagami River (Photograph 1). A second cofferdam is required at the tailrace to dewater approximately 500 m^2 (0.05 hectares) of river, part of which is presently existing tailrace (Photographs 2 and 3), to allow construction of the new tailrace configuration. It is anticipated that the upstream cofferdam will be in place for 6 months, and the downstream cofferdam will be in place for 12 to 14 months (Fitchko, 2006).

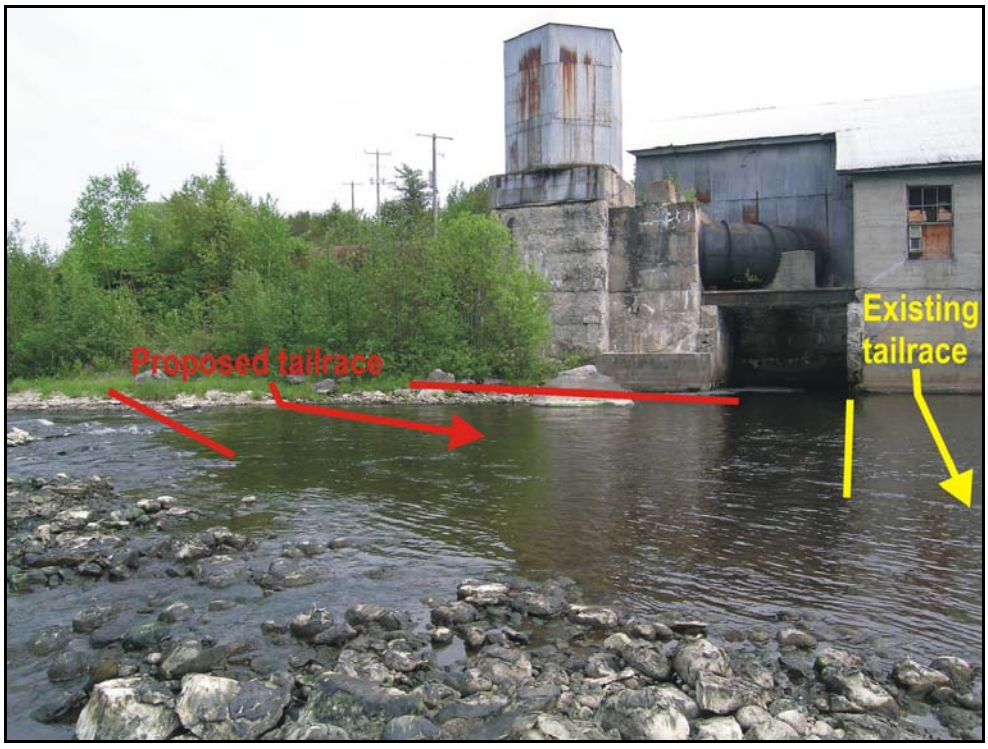
During the period when no flow is being diverted through the GS, all flow in the Mattagami River will be passing through the spill channel (Figure 2).

Mitigation

- In-water construction and removal of cofferdams should be timed to avoid the spawning and incubation period of spring spawning fishes, such as walleye and suckers, which typically excludes in-water work from April 1 to June 15.
- If all water is being diverted through the spill channel at the time of the walleye and sucker spawning period, all water should continue to be diverted through the spill channel until the end of the hatch (June 15).

Photograph 1: View of intake structure and area to be temporarily isolated with a cofferdam and de-watered.

Photograph 2: Downstream view of Sandy Falls GS showing the existing tailrace and the approximate location of the proposed tailrace.



Photograph 3: View of the proposed tailrace location at Sandy Falls GS, from the existing cobble shoal that has developed along the upstream edge of the existing tailrace. June 8, 2005.

- Sediment and erosion control measures should be implemented as required prior to work and maintained during the work phase, to prevent entry of sediment into the water. This should include sediment removal from water pumped from within cofferdam enclosures.
- All materials and equipment used for the purpose of site preparation and project completion should be operated and stored in a manner that prevents any deleterious substance (e.g. petroleum products, debris etc.) from entering the water.
- Blasting, if required, should adhere to the Fisheries and Oceans Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters (http://www.dfo-mpo.gc.ca/canwaters-eauxcan/infocentre/guidelines-conseils/guides/explosguide/chap3_e.asp#GUIDELINES).

Assessed impact

The relatively small areas that will be temporarily dewatered have historically been impacted by the construction and operation of the existing Sandy Falls GS, and are likely exposed bedrock or exposed bedrock overlain with a relatively thin layer of coarse granular material. Because these areas were designed to convey water efficiently, the bottom has few protruding features that would provide structural habitat for fish. These areas are not thought to be critical for any life stages of any of the species present, and the fact that they are temporarily unavailable is not expected to have any significant impact on the overall fish production of the system.

Diverting all flow through the spill channel will not result in increased erosion since the spill channel is the original channel of the Mattagami River, and has historically accommodated the

total river flow. Flows in the important walleye and sucker spawning habitat that occurs downstream of the tailrace will not be altered during this construction period, as they are downstream of the confluence of the tailrace and the spill channel, and flow in the Mattagami River will continue to be managed as it was prior to the redevelopment. Walleye spawning observations in 2005 and 2006 did not identify the spill channel as a significant spawning area for walleye or suckers, and no other critical or important habitats are thought to occur here that may be impacted by this temporary change in spill channel flow regime. The temporary change in spill channel flow regime is not expected to have a negative effect upon the resident fish community within the spill channel.

4.3 Operation of the new Sandy Falls Generating Station

The redeveloped Sandy Falls GS will remain a run-of-the-river hydroelectric plant, and therefore redevelopment will not change the flow regime of the Mattagami River or the management of water levels in the upstream reservoir. However, the proposed GS will have a greater flow capacity and therefore will alter the distribution of flow volume between the GS and the 200 m long spill channel (Figure 2). Presently, water is spilled through the original river channel (spill channel) when flows exceed the 44 m^3/s capacity of the GS, which occurs approximately 48% of the time (Ontario Hydro, 1992). The redeveloped Sandy Falls GS will have a rated flow of 65.4 m^3/s which will decrease the frequency of water spilled through the spill channel from approximately 48% to approximately 30% of the time (Fitchko, 2006). When the GS is capable of taking all river flow, $\leq$1 m^3/s leaks through the weir, providing a small amount of flow to the spill channel. This is not expected to change as a result of redevelopment.

Downstream of where the tailrace joins with the spill channel, flow velocity and volume will not differ between pre- and post-redevelopment, however, the adjusted location and discharge direction will result in some changes in flow velocity pattern in the immediate vicinity of the new tailrace area. Flow velocity entering the intake and exiting the tailrace will not differ significantly between pre- and post-development (Francois Vitez, Ing., Gestion Conseil SCP, personal communication. November 13, 2006).

Mitigation
No mitigation is proposed.

Assessed impact
The existing flow regime within the spill channel is $\leq$1 m^3/s for approximately 52% of the time. Post-development flows of $\leq$1 m^3/s within the spill channel will occur approximately 70% of the time, with most flows in excess of 1 m^3/s occurring during the spring freshet. The minimum flow of $\leq$1 m^3/s (dam leakage) is thought to be the limiting factor for fish productive capacity of the resident fish community within the spill channel, and therefore a further decrease in the frequency or duration of flows that exceed 1 m^3/s is not expected to decrease the productivity of the spill channel fish community. No critical habitats have been identified within the spill channel that could influence productive capacity.

Changes in flow direction will likely cause some shifts in habitat utilization in the immediate

vicinity of the tailrace, however, neither the types or quantities of habitat will change significantly, and no significant change in productivity is expected. There are no known critical habitats within the tailrace. The fact that the existing tailrace and the proposed tailrace will continue to discharge into the deep pool adjacent to the GS, ensures that any shifts in habitat utilization caused by flow direction or velocity changes will be local and will dissipate well upstream of the critical habitats located downstream of the existing Sandy Falls GS (Figure 2).

5.0 CONCLUSION

Provided that the recommended mitigation measures are implemented, it is our opinion that the redevelopment of the Sandy Falls site, and the subsequent operation of the new and enlarged GS, will not have a significant or measurable impact upon the composition or production of the Mattagami River fish community.

The key points of this assessment are as follows:

- No critical fish habitats, such as walleye or sucker spawning habitats, will be directly altered.
- There will be no changes in the volume of water passing over the critical walleye and sucker spawning habitat downstream, and thus no change in velocities.
- The areas that will be directly altered are mostly manmade habitats (the intake structure, the tailrace, and immediate tailrace vicinity) and, although they do contain fish, the fact that they will be temporarily unavailable is not expected to have a significant impact on the productive capacity of the system.
- Following the completion of construction the total amount of habitat will be unchanged.

6.0 REFERENCES

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