

## **Annex A Statement of Work**

### **Rotenone Treatment of Lakes and Streams in the Isaïe-Ouest Lake Watershed, La Mauricie National Park**

#### **1. Background**

Since 2006, La Mauricie National Park (LMNP) has been working to restore indigenous populations of brook trout (*Salvelinus fontinalis*), with the goal of maintaining and promoting the development of local genetic lineages. The various projects that have been completed and that are in progress involve capturing brook trout specimens, keeping them and having them reproduce in captivity, eliminating introduced fish species using a rotenone-based piscicide product and eventually reintroducing fish from the designated population.

As part of the National Conservation and Restoration Program (CoRe), the next activity will focus on restoring certain lakes and streams in the Isaïe-Ouest Lake watershed (Appendix 1). In order to do so, all the streams will need to be treated, from the head of the identified watersheds of the Loubal, La Pipe and Isaïe-Ouest lakes up to a fall located on the Isaïe Stream approximately 2 km from the Mattawin River.

#### **2. Challenge**

Entirely comprised within the territory of La Mauricie National Park, the Isaïe-Ouest lake watershed includes six lakes and a relatively complex network of streams (appendixes 1 and 2). Originally, brook trout was the only species capable of colonizing the waters of this watershed. However, starting in 1940, perch (*Perca flavescens*), creek chub (*Semotilus atromaculatus*) and longnose dace (*Rhinichthys cataractae*) were introduced and spread throughout the entire watershed (Plante, 1996).

A residual population of brook trout was found in La Pipe Lake in 2014. The genetic identity of this population was found to be unique (Bernatchez and Bernatchez, 2016) and a restocking plan adapted to the local situation was developed to conserve it (Valiquette, 2017). In order to preserve this genetic diversity, the population from La Pipe Lake will be kept and made to reproduce in captivity in order to restock the La Pipe and Hamel-Ouest lakes after they have been treated with a piscicide to eradicate fish species that were introduced into this watershed.

The entire sector to be treated cannot be accessed by road. Trails and a work camp have been developed to allow for the preparation of the sites and the piscicide treatment itself. Field preparations (access, clearing of streams, creation of upstream migration fish barriers, temporary barriers or cofferdams) along with the transportation of materials, equipment and personnel will be assumed by the national park. Completing these various activities will require the use of aerial transportation (helicopter and/or float plane).

### **3. Locations and Project Scope**

Piscicide treatment using Nusyn-Noxfish in the Loubal, La Pipe and Isaïe-Ouest lakes is scheduled for 2017 (Appendix 3). The bathymetry maps, stream characteristics and product volumes to be used are presented in appendixes 4 to 10.

#### **3.1 Loubal Lake**

A precise bathymetry of Loubal Lake was conducted in the summer of 2016 (Appendix 5). Its surface area is 12,616 m<sup>2</sup> (1.3 ha) and its volume is 43,105 m<sup>3</sup>. The average depth is 2.7 metres and the maximum depth is 9.7 metres.

There is a significant wetland surface area along the periphery of this lake as well as all along its emissary. On the 1:20,000 scale map, this lake has a single unbranched tributary located on the north side, approximately 1.5 km in length and along which there are two wetlands. The nature and surface area of these wetlands, as well as the length of the tributary to be treated, will be determined in a definitive manner in the spring of 2017 by Parks Canada staff.

The Journet Lake emissary flows into Loubal Lake emissary (see Appendix 2). An upstream migration fish barrier (UMFB) was created approximately 100 metres from the confluence of these two streams on the Journet Lake emissary. The downstream section of this stream will need to be treated up to the UMFB and a dripping barrel will need to be installed at the UMFB in order to prevent untreated water from getting downstream.

The preparatory work to be completed by Parks Canada personnel will include the creation of a network of trails to provide access to the zones to be treated, the clearing of streams and the lowering of beaver ponds. A preliminary treatment plan for Loubal Lake was prepared by Mr. Michel Lemieux, a consulting biologist who is now retired from the Ministère des Forêts, de la Faune et des Parcs in Quebec and a pioneer in the use of rotenone-based piscicide treatments in Quebec, in collaboration with Parks Canada personnel (see Appendix 4 for the preliminary product volumes determined for Loubal Lake and the associated streams). This treatment plan will be refined in the summer of 2017 by the company selected to complete this work and Parks Canada staff, based on the final characterization of the zone to be treated which will be undertaken in the spring of 2017 by Parks Canada staff.

### **3.2 La Pipe Lake**

A precise bathymetry of La Pipe Lake was conducted in the summer of 2014 (Appendix 6). Its surface area is 507,870 m<sup>2</sup> (50.8 ha) and its volume is 3,820,669 m<sup>3</sup>. The average depth is 6.6 metres and the maximum depth is 19.0 metres.

In addition to the Loubal Lake emissary, which flows into the north side of La Pipe Lake, the latter receives water from four other tributaries as can be seen on the 1:20,000 scale map (Appendix 3). The largest of these tributaries, located on the east side of the lake, has a natural UMFb on the edge of La Pipe Lake and has not been colonized by any fish species. Treatment of this stream is not planned, but a dripping barrel must be installed in order to prevent untreated water from flowing into La Pipe Lake. The other three tributaries do not appear to be branched on the 1:20,000 scale map and are all less than a kilometre in length (Appendix 3).

Small wetland surface areas are located at the mouth of most of the tributaries on La Pipe Lake. The lake's emissary has the largest wetland surface areas in this sector (Appendix 2). The planned lowering of La Pipe Lake, which will be completed by Parks Canada personnel in the summer of 2017, should significantly reduce the wetland surface area to be treated. The nature and surface area of these wetlands, as well as the length of the tributary to be treated, will be determined in a definitive manner in the spring of 2017 by Parks Canada staff.

The preparatory work to be completed by Parks Canada personnel will include the creation of a network of trails to provide access to the zones to be treated, the clearing of streams and the lowering of beaver ponds. A preliminary treatment plan for La Pipe Lake was prepared by Mr. Michel Lemieux, in collaboration with Parks Canada staff (see appendixes 4 and 11 for the preliminary product volumes determined for La Pipe Lake and the associated streams). This treatment plan will be refined in the summer of 2017 by the company selected to complete this work and Parks Canada staff, based on the final characterization of the zone to be treated which will be undertaken in the spring of 2017 by the park staff.

A Parks Canada motorboat will be available on La Pipe Lake during the work.

### **3.3 Isaïe-Ouest Lake**

A precise bathymetry of Isaïe-Ouest Lake was conducted in the summer of 2014 (Appendix 7). Its surface area is 387,719 m<sup>2</sup> (38.8 ha) and its volume is 1,651,576 m<sup>3</sup>. The average depth is 4.7 metres and the maximum depth is 19.6 metres.

Isaïe-Ouest Lake receives water from five tributaries according to the 1:20,000 scale map (appendices 2 and 3). Among these, there is the La Pipe Lake emissary, discussed above, as well as the Hamel-Ouest Lake emissary. The main branch of this stream must be treated over a distance of approximately 500 metres, up to a natural UMFb upstream of which the undesirable fish species have already been eliminated (Appendix 10). A dripping barrel will still need to be installed at this UMFb in order to prevent untreated water from getting downstream. Among the three other

tributaries of Isaïe-Ouest Lake, all located on the north side of the lake, two have branches that cut across wetlands (appendices 2 and 3).

There are significant wetland surface areas along the periphery of Isaïe-Ouest Lake (appendixes 2 and 3). Furthermore, the lake area where the depth is between zero and one metre contains a large surface area of aquatic plants, with a notable presence in the central portion of the lake (see appendixes 3 and 10).

The Isaïe-Ouest Lake emissary also needs to be treated up to a natural UMFB previously identified (Appendix 3). There are two wetlands along the periphery of this stream between the UMFB and the lake that also need to be treated (Appendix 8).

The nature and surface area of the various wetlands and aquatic plants, as well as the section of the tributary to be treated, will be determined in a definitive manner by Parks Canada personnel during the final characterization of the sector in the spring of 2017.

The preparatory work to be completed by Parks Canada personnel will include the creation of a network of trails to provide access to the zones to be treated, the clearing of streams and the lowering of beaver ponds. A preliminary treatment plan for Isaïe-Ouest Lake was prepared by Mr. Michel Lemieux, in collaboration with Parks Canada staff (see appendixes 4 and 12 for the preliminary product volumes determined for Isaïe-Ouest Lake and the associated streams). This treatment plan will be refined in the summer of 2017 by the company selected to complete this work and Parks Canada staff, based on the final characterization of the zone to be treated which will be undertaken in the spring of 2017 by the park personnel.

A Parks Canada motorboat will be available on Isaïe-Ouest Lake during the work.

## **4. Object of the invitation to tender**

### **4.1 Supervision**

Provide the necessary supervision in preparing the final treatment plan by:

- Specifying, in collaboration with Parks Canada staff, the final treatment strategy in order to determine the definitive volume for the product needed, the positioning of the product, the materials and equipment as well as the means of access.

### **4.2 Application**

Complete the application of the product in the streams of the sectors in question, in accordance with the prescribed dosage and the special application directives that might be listed in the project authorization and treatment plans by:

- Providing the equipment and materials needed for treating lakes as well as streams and wetlands;
- Providing personnel authorized to apply the product in question;
- Supplying the safety equipment for the personnel assigned to the evaluation of the sites and to the treatment operations themselves;
- Disposing of the empty Nusyn-Noxfish containers (barrels or other containers) once they have been returned to the road network, either by sending them to a landfill site or, ideally, recycling them.

### **4.3 Purchase of the Product**

Act as an intermediary in purchasing the required quantity of the rotenone-based product by:

- Ensuring the temporary financing for the purchase, an amount that will be reimbursed upon presentation of an invoice to Parks Canada;
- Coordinating the storage of the product and delivery to the treatment site during the week preceding the treatment;
- Re-allocating, if applicable, any surplus product to other projects.

## **5. Requirements**

The Contractor must have a valid permit for using and purchasing pesticides under the *Pesticides Act* (R.S.Q. c. P-9.3). It must also have the qualification certificates for the employees assigned to completing the treatment (pesticide application certificate) under the same legislation.

The Contractor must be in compliance with road transportation regulations (*Transportation of Dangerous Goods Act*, R.S.C. 1992, c. T-19.01 regulations under SOR/85-77) when transporting the product between the storage site in the park and the treatment sites.

The business, as well as the employees who will be assigned to this contract, have undeniable experience with rotenone treatments. Supporting documentation must be provided.

## **6. Other Contractual Specifications**

### **6.1 Authorizations**

All the steps needed to obtain the various authorizations for the treatment (MFFP-Quebec, Parks Canada Agency) will be undertaken by Parks Canada.

### **6.2 Parks Canada Tasks**

The national park will transport the personnel, materials, product and equipment from the most appropriate road access point to the treatment zones. Site preparations, including working on the access trails, the shrubs pruning over the streams, lowering the water levels, putting in place the upstream migration fish barriers and constructing the dikes on the lake emissaries will be assumed by park personnel in accordance with needs and recommendations from the consultant. The preliminary treatment plans have already been prepared by Mr. Michel Lemieux, in collaboration with Parks Canada staff. The final treatment plans will be developed jointly by the consultant and Parks Canada personnel, based on the results from the final field characterization scheduled for the spring of 2017.

### **6.3 Validation of the Treatment's Effectiveness**

The Park will validate the treatment's effectiveness in accordance with the modalities prescribed in the project authorization.

### **6.4 Product to be used**

The product selected for treatment is Nusyn-Noxfish, which contains 2.5% rotenone as well as 2.5% of a synergistic-action product called "piperonyl botoxide" (Prentiss Inc.). The product volume planned for each lake as well as the streams is presented

in Appendix 5. The preliminary treatment plans call for releasing a total of 2,460 US gallons (Table I).

Table I. Quantity of Nusyn-Noxfish planned (in US gallons) per sector to be treated and total based on preliminary treatment plans

<b>Sector</b>	<b>Quantity of Nusyn-Noxfish (US gallons)</b>		
	<b>Lake</b>	<b>Stream</b>	<b>Dripping Barrel</b>
<b>Loubal</b>	30	15	-
<b>La Pipe</b>	1,530	25	5
<b>Isaïe-Ouest</b>	780	30	45
<b>Subtotal</b>	2,340	70	50
<b>Total</b>		2,460	

## 7. Completion Schedule

The main steps will be:

<b>Nature of the Activities</b>	<b>Work Period</b>	<b>Responsibilities</b>
Issuing of the contract	March-April 2017	LMNP
Orientation meeting	July 2017	LMNP, Consultant
Site visit	July-August 2017	LMNP, Consultant
Final treatment plan	July-August 2017	LMNP, Consultant
Purchase of the product	August 2017	Consultant
Site preparation (access, stream clearing, UMFB, lowering of water levels, monitoring of beaver activities)	July-September 2017	LMNP
Treatment	September 2017	LMNP, Consultant
Verification fishing	October 2017, May 2018	LMNP



## **8. Bibliography**

**Bernatchez, S. and L. Bernatchez, 2016.** Caractérisation génétique des populations restantes d'omble de fontaine (*Salvelinus fontinalis*) du bassin versant du lac La Pipe in the La Pipe Lake Watershed], La Mauricie National Park. 36 p.

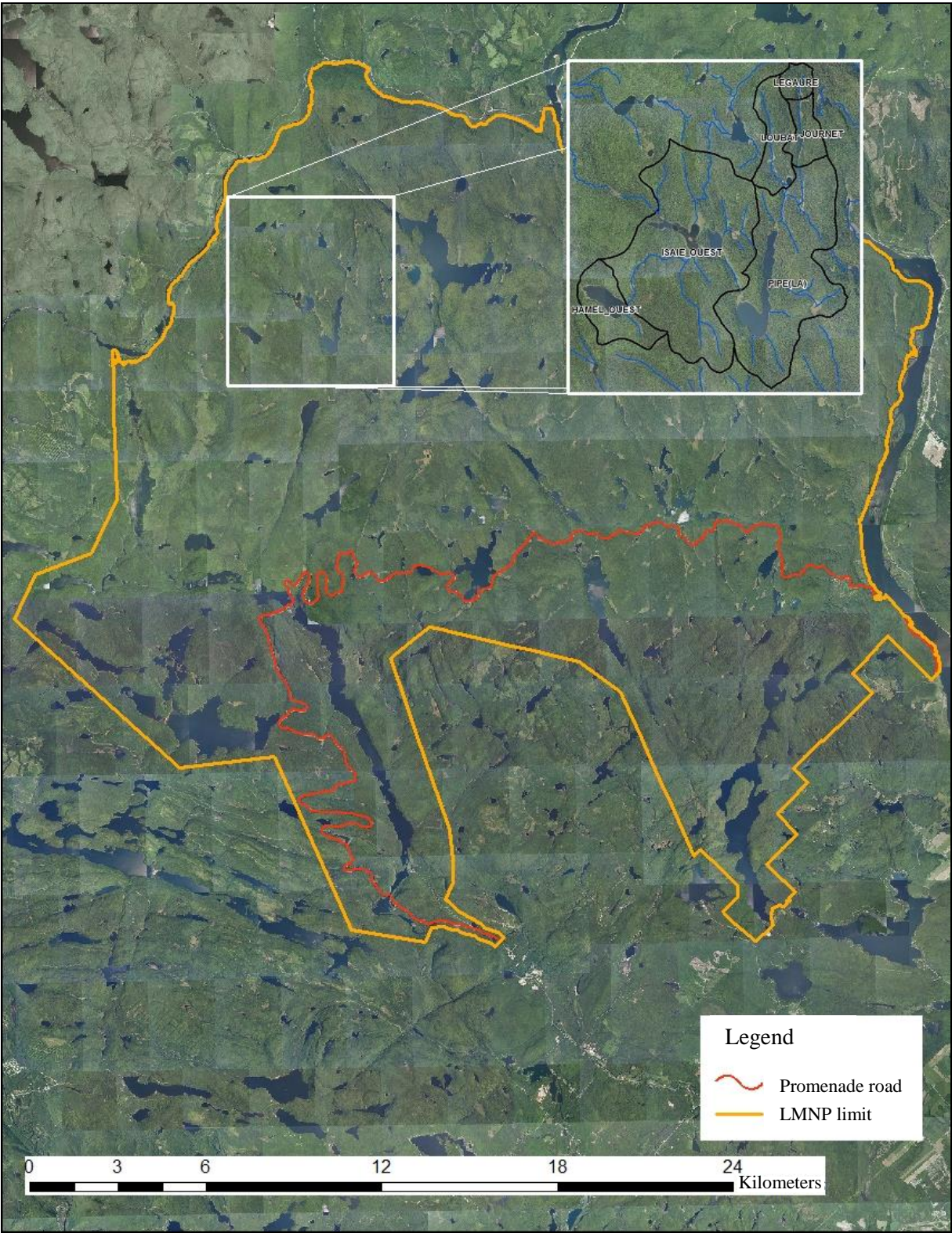
**Plante, M., 1996.** Les communautés de poissons du parc national de la Mauricie. De l'origine à aujourd'hui. Resources Conservation Service. La Mauricie National Park. 93 p and appendices.

**Plante, M., 2015.** Restauration de la biodiversité piscicole des plans d'eau bassin versant du lac la Pipe, La Mauricie National Park. Not published. Parks Canada Agency, MWQFU, Resources Conservation Service. March 2015. 14 p and appendices.

**Plante, M., Synnott, G., Van Dijk, A., Veillette. D. and A. Savoie, 2006.** Évaluation environnementale stratégique du Programme de restauration d'écosystèmes aquatiques du parc national du Canada de la Mauricie. Mauricie and Western Quebec Field Unit, Resources Conservation Service, La Mauricie National Park, 48 p. and appendices.

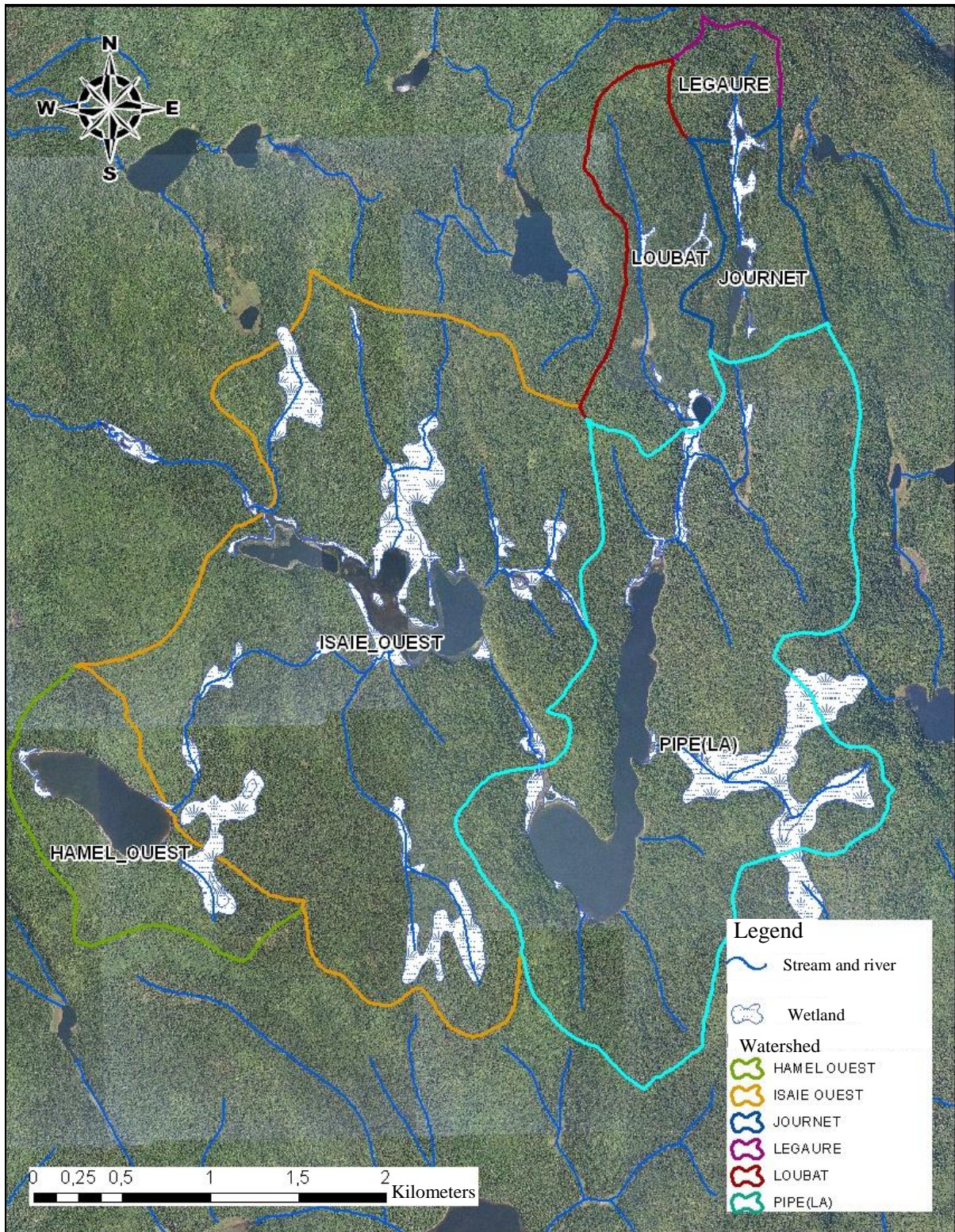
**Valiquette, M.-A., 2017.** Plan de reproduction d'une population d'ombles de fontaine originaire du lac La Pipe et introduite dans les lacs Isaïe-Ouest et La Pipe [Reproduction plan for a population of brook trout originally from the Hamel-Ouest Lake emissary and introduced into Hamel-Ouest Lake]. 13 p.

# Appendix 1. Location of the Isaïe-Ouest Lake Watershed



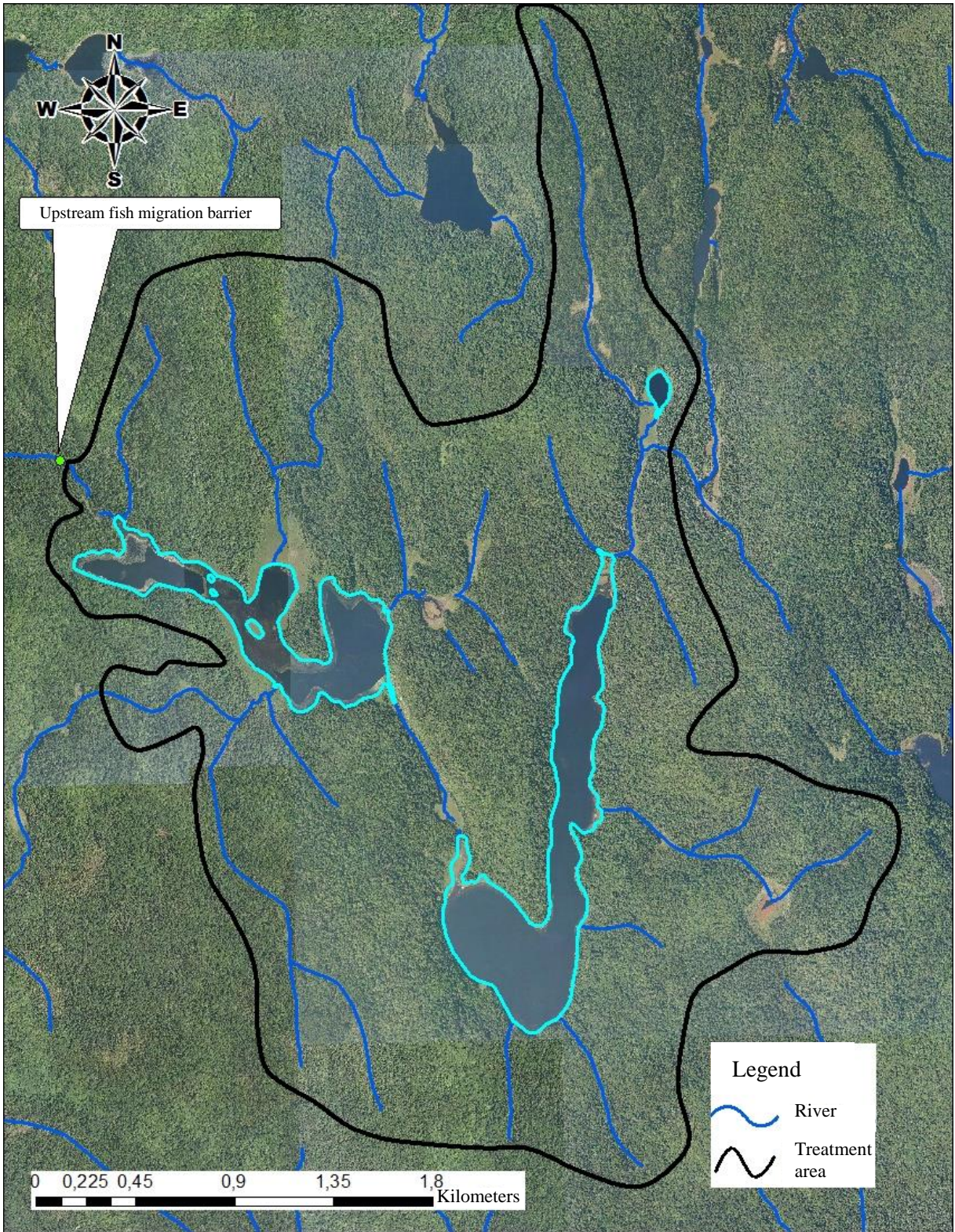


## Appendix 2: Watersheds of the Isaïe-Ouest, La Pipe, Loubal, Hamel-Ouest, Journet and Legaure Lakes and their Respective Wetlands





### Appendix 3: Treatment Zone for Loubal, La Pipe and Isaïe-Ouest Lakes

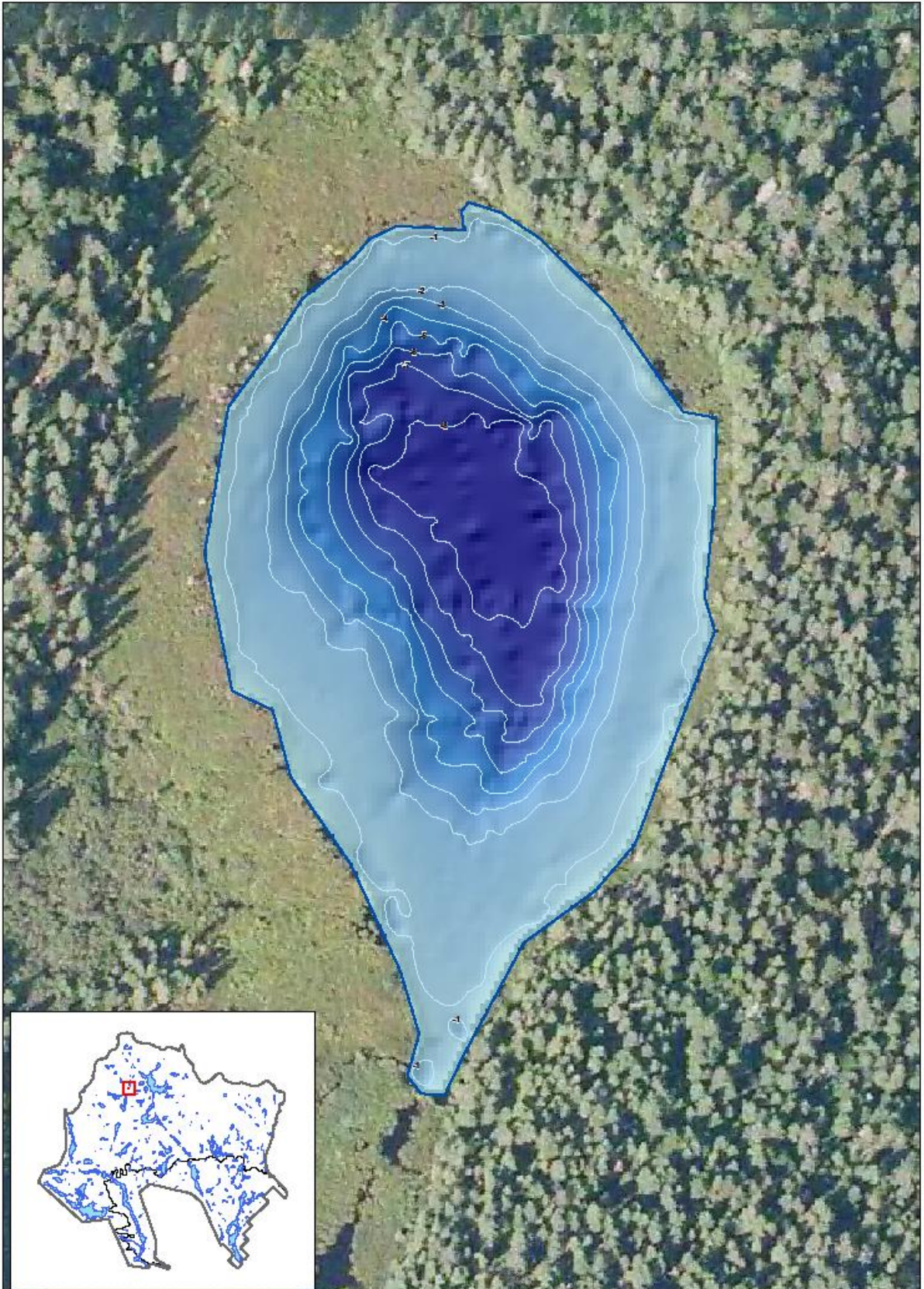




**Appendix 4: Morphometric parameters of the lakes, length of the streams to be treated, dosage and volume of the Nusyn-Noxfish proposed in the preliminary treatment plan**

Lakes	Surface area (ha)	Max. depth (m)	Average depth (m)	Volume (m <sup>3</sup> )		Linear km of stream	Nusyn-Noxfish					Species present	
				Total	Lowered		Lake treatment		Stream treatment				
							Total volume (US gallons)	Average concentration (ppm)		Total volume (US gallons)	Average volume (US Gallons) / km of linear stream		Dripping barrel
								Full lake	Lowered lake				
Loubal	1.3	9.7	2.7	43,105	-	2.9	30	2.63	-	15	5.2	-	SEAT
La Pipe	50.8	19.0	6.6	3,820,669	3,585,426	6.3	1,530	1.52	1.62	25	4.0	5	PEFL, SEAT, RHCA
Isaïe-Ouest	38.8	19.6	4.7	1,651,576	1,538,560	10.5	780	1.79	1.92	30	2.9	45	PEFL, SEAT, RHCA

# Appendix 5: Bathymetric Map of Loubal Lake



Classifying		Morphometric parameters		Isobath	Volume (m <sup>3</sup> )	Area (m <sup>2</sup> )
	-1.811329147 - 0.103180456	Max width (m)	306.89	1-1 m	12114.28	12615.5
	-3.357847674 - -1.811329148	Max length (m)	380.62	2-2 m	8628.94	11132.86
	-5.272137278 - -3.357847675	Max depth (m)	9.68	3-3 m	5036.42	6578.86
	-7.112992687 - -5.272137279	Average depth (m)	2.7	4-4 m	4056.38	5488.62
	-9.285202026 - -7.112992688	Volume (m <sup>3</sup> )	43304.54	5-5 m	3901.32	4484.62
		Area (m <sup>2</sup> )	13615.5	6-6 m	3148.89	3524.09
		Perimeter (m)	474.26	7-7 m	2428.03	2785.35
				8-8 m	1574.34	2043.76
				9-9.68 m	324.96	3035.99

	Lake outline
	Isobath 1m

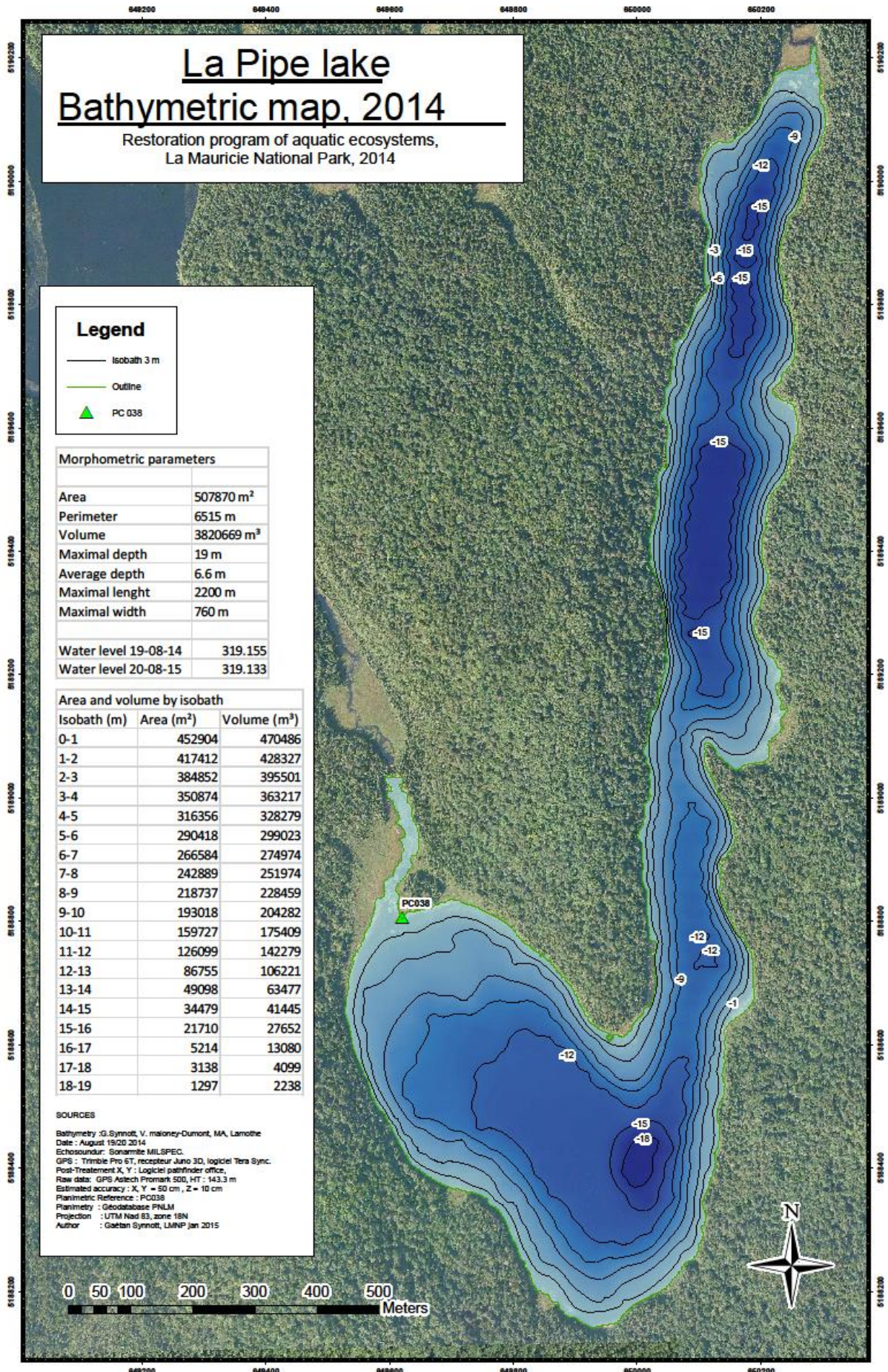
**Loubal Lake**

Source : La Mauricie National Park  
 Date : 06/23/2016  
 Acquisition date : 06/20/2016  
 Auteurs : La Mauricie National Park  
 Projection : NAD 1983 UTM zone 18N

0 5 10 20 1:750

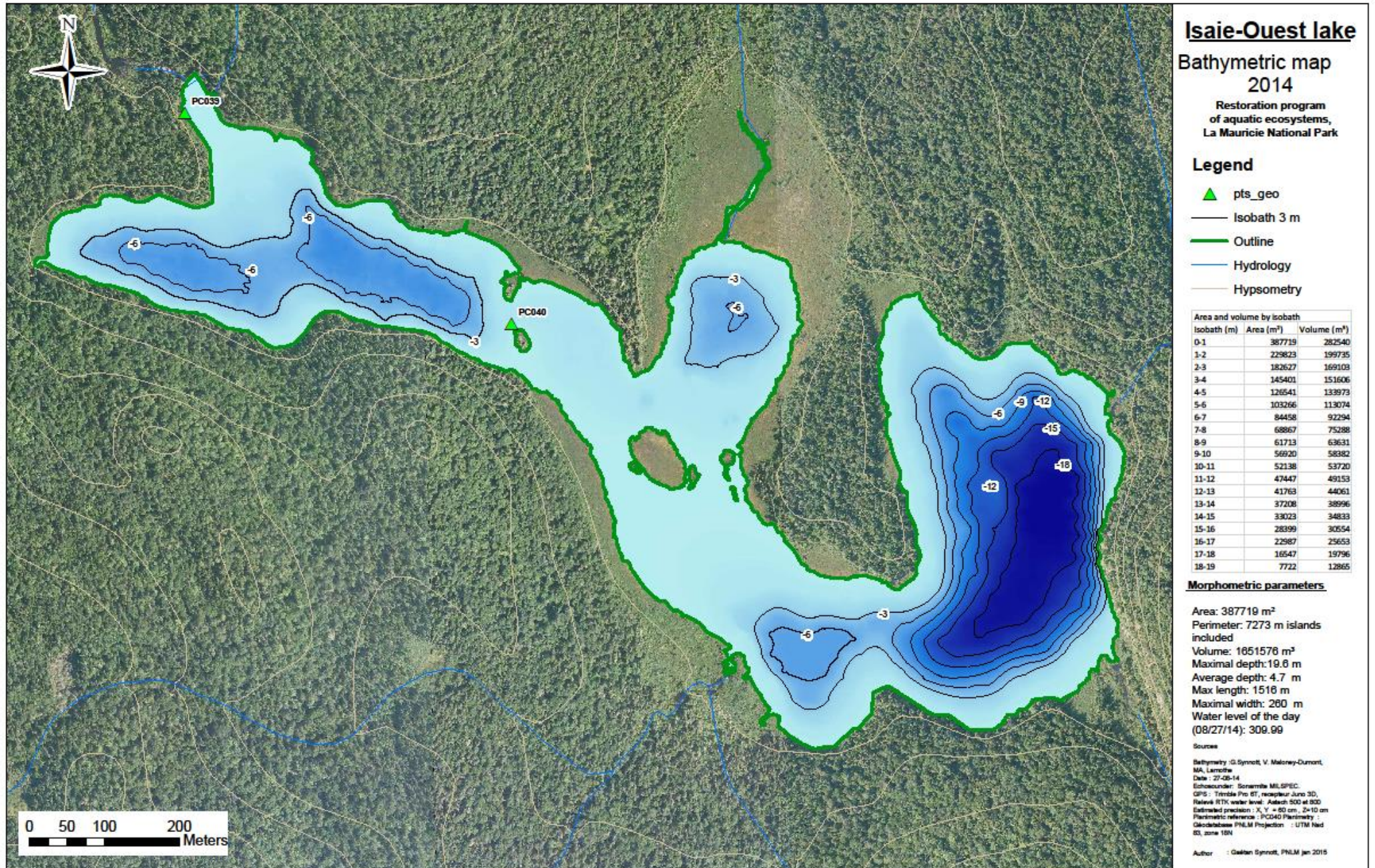


# Appendix 6: Bathymetric Map of La Pipe Lake





## Appendix 7: Bathymetric Map of Isaïe-Ouest Lake





## Appendix 8: Isaïe-Ouest Lake Emissary Between the Lake and the Barrier (UMFB)



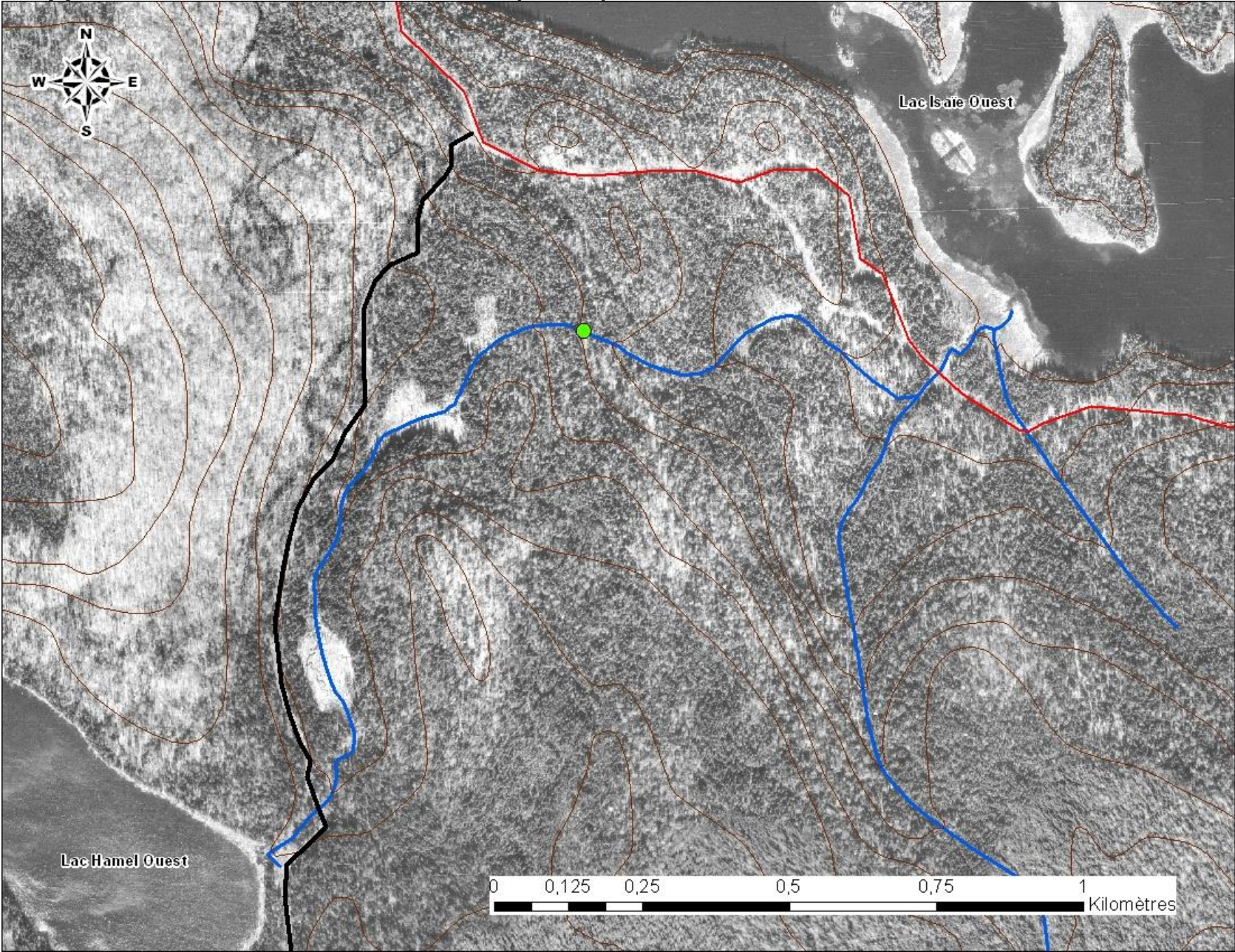


# Appendix 9: La Pipe Lake Emissary





**Appendix 10: Location of the Barrier (UMFB) Between Hamel-Ouest and Isaïe-Ouest Lakes**



## Appendix 11: La Pipe Lake Preliminary Treatment Plan

### La Pipe Lake Preliminary Treatment Plan

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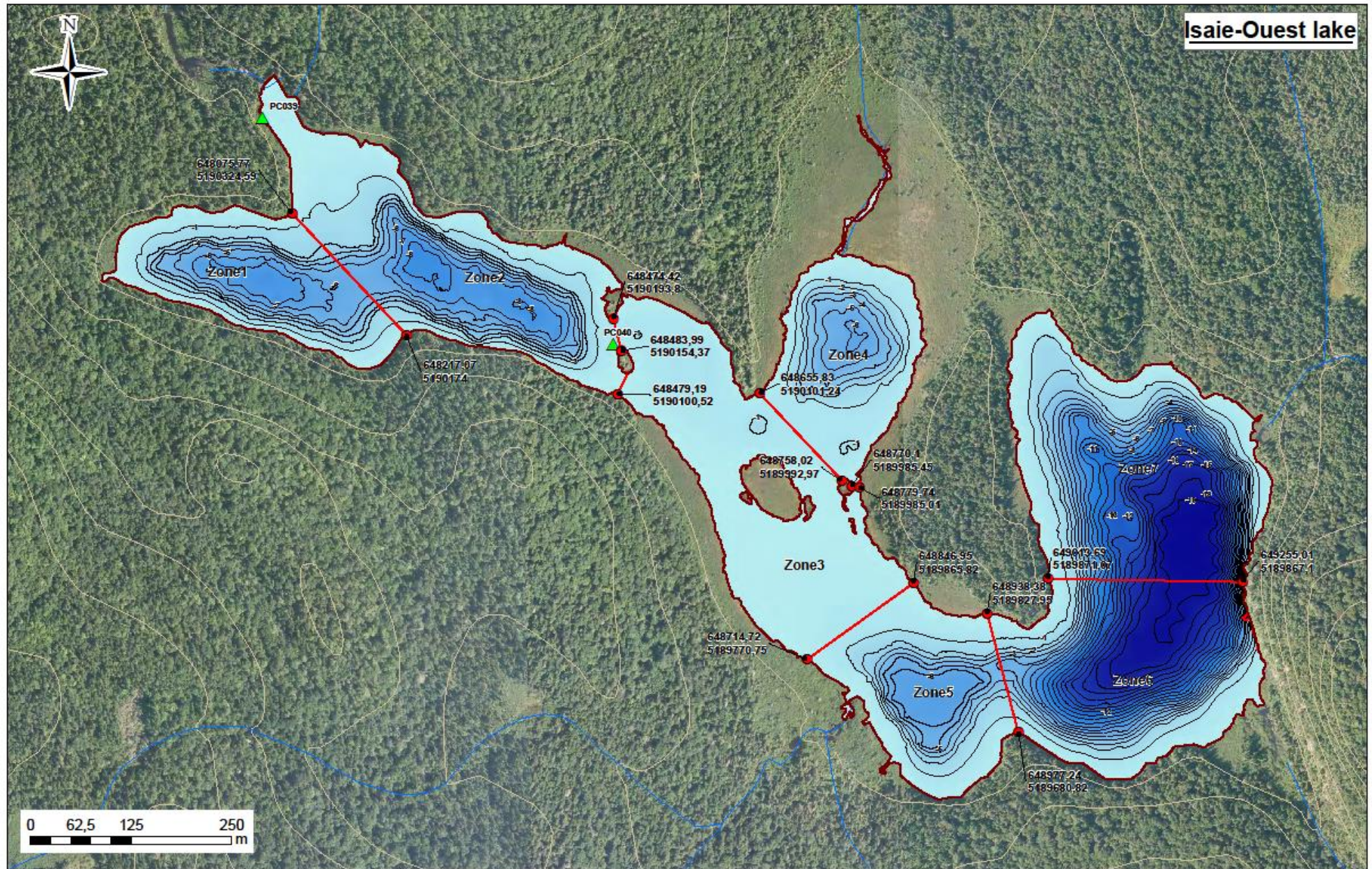
Zones	gal US
Périphérie:	30
ZONE 1 TOP:	180
ZONE 1 DEPTH:	30
ZONE 2 TOP:	310
ZONE 2 DEPTH:	50
ZONE 3:	150
ZONE 4 TOP:	375
ZONE 4 DEPTH:	60
ZONE 5 TOP:	315
ZONE 5 Depth:	30
Total Lake	1530
Total stream:	25
Total dripping barrel	5

Lake Periphery : 2,0 ppm

Rest of the lake : 1,5 ppm



# Appendix 12: Isaïe-Ouest Lake Preliminary Treatment Plan





## Isaïe-Ouest Lake Preliminary Treatment Plan

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Zone	gal <b>US</b>
Pourtour (sauf zone 3):	90
ZONE 1:	50
ZONE 2:	80
ZONE 3:	60
ZONE 4:	30
ZONE 5:	60
ZONE 6 TOP:	160
ZONE 6 DEPTH:	40
ZONE 7 TOP:	170
ZONE 7 DEPTH:	40
Lake total	780
Stream total:	30
Dripping barrel total	45

Lake periphery and zone 3: 2 ppm

Rest of the lac: 1,5 ppm