

# Pulp & Paper Effluent Regulations

ANNUAL REPORT  
2020



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## REVIEW NOTICE

The information used in this report was submitted to Environment and Climate Change Canada (ECCC) by regulated pulp and paper mills and off-site treatment facilities as required under section 7 of the *Pulp and Paper Effluent Regulations* (PPER) pursuant to the Fisheries Act. Environment and Climate Change Canada compiled this report to inform the regulated community, other stakeholders and the interested public on the PPER, for informational purposes only. For all purposes of interpreting and applying the law, users should consult the PPER at the following [link](#), as registered by the Clerk of the Privy Council and published in Part II of the Canada Gazette.



## EXECUTIVE SUMMARY

This report summarizes compliance and effluent discharge amounts of Canadian pulp and paper mills with respect to the selected standards prescribed by the *Pulp and Paper Effluent Regulations* (PPER), which came into force on May 7, 1992.

The data used in this report were provided to Environment and Climate Change Canada under section 9, 28, 29, and 30 of the Regulations, which requires mills to submit monthly reports to Environment and Climate Change Canada as well as environmental effects monitoring (EEM) reports on a designated cycle. The format for the monthly effluent reports is specified in Schedule II of the Regulations. The monthly effluent reports include:

- the biochemical oxygen demand (BOD) of BOD matter in effluent;
- the quantity of suspended solids in effluent;
- effluent volume; and
- summary results of rainbow trout acute lethality tests and *Daphnia magna* monitoring tests.

In 2020, 74 pulp and paper mills operating in Canada were subject to the Regulations. The self-reported data showed a high level of compliance, with 99% of results below the limits for suspended solids (SS) and biological oxygen demand (BOD), 97% of tests not acutely lethal to rainbow trout, and 99% of tests showing no effect on *Daphnia magna*.

The annual effluent loading from Canadian pulp and paper mills (SS released per tonne of production and kilograms of BOD released per tonne of production) remained stable at the national level, with a total of 2.70 kg/tonne of production of SS and 1.30 kg/tonne of production of BOD released to the environment in 2020.

Canadian pulp and paper mills subject to the PPER are required to conduct comprehensive environmental effects monitoring (EEM) studies. The EEM requirements consist of sublethal toxicity testing of mill final effluent and biological monitoring studies conducted in the receiving environment to assess potential impacts of effluent. Mill final effluents show sublethal toxicity impacts of growth and reproduction inhibition in laboratory test species in more than half of all tests conducted. The data from biological monitoring studies, submitted up until 2019 show that mill final effluents from 77% of the mills have impacts on receiving environments.

## INTRODUCTION

The *Pulp and Paper Effluent Regulations* (PPER) were first published, under the *Fisheries Act* in 1971 to control discharges of deleterious substances and reduce the effects on fish and fish habitat that had been observed at pulp and paper mills across Canada at that time. By the late 1980s, Environment and Climate Change Canada had determined that the 1971 Regulations had not yielded all of the desired effluent quality improvements. The Government amended the PPER in 1992 to introduce enforceable effluent quality standards for all mills; a requirement for effluents to be non-acutely lethal to rainbow trout; and a requirement to conduct comprehensive environmental effects monitoring (EEM) studies to assess potential impacts of mill effluent on receiving environments.

The PPER set limits on the amounts of biochemical oxygen demand (BOD) matter and suspended solids (SS) that may be deposited by pulp and paper mills, and prohibit deposits of effluents that are acutely lethal to rainbow trout. The PPER also set out monitoring and reporting requirements. The Regulations are administered by Environment and Climate Change Canada and apply to all pulp and paper mills in Canada. The full text of the Regulations outlining all the requirements is available online at the following [link](#).

This report summarizes compliance, effluent quality data and environmental effects monitoring results up to and including 2020. Supplementary information on individual mills is provided in the appendices.

## OVERVIEW OF DIRECT DEPOSIT MILLS SUBJECT TO THE PPER IN 2020

In 2020, 74 pulp and paper mills depositing effluent directly into water frequented by fish in Canada were subject to the Regulations. These mills have a total of 119 outfall structures, which are structures through which effluent is conveyed from a mill to a location where it is deposited in water frequented by fish, or in any place from which it may enter such water, or to a wastewater treatment system. Mills are located in all provinces except for Prince Edward Island and Saskatchewan. No mills are located in the territories. A map illustrating each mill's location is presented in Figure 1. A detailed list of mills is in Appendix A.





**Figure 1:** Distribution of Canadian Mills in Operation (2020)

## OVERVIEW OF ANNUAL COMPLIANCE AND DISCHARGE AMOUNTS OVER TIME

Table 1 shows compliance of self-reported data on suspended solids, BOD tests, acute lethality tests on rainbow trout, and effect on *Daphnia magna* tests. In addition, Table 1 shows the total suspended solids and BOD discharged annually under the PPER from 2006 to 2020.

**TABLE 1: PPER COMPLIANCE AND TOTAL ANNUAL DISCHARGE AMOUNTS OVER TIME**

| YEAR | Total Number Of Mills Subject To PPER <sup>1</sup> | Total Effluent Flow (million m <sup>3</sup> ) | Total Biochemical Oxygen Demand (kt) | Total Suspended Solids (kt) | Total BOD Tests Passed (%) | Total SS Tests Passed (%) | Total Acute Lethality Percent of Tests Passed (%) | Total <i>Daphnia magna</i> Percent of Tests Passed (%) |
|------|--|---|--------------------------------------|-----------------------------|----------------------------|---------------------------|---|--|
| 2006 | 113  | 1880  | 38.2                                 | 80.2                        | 99.9                       | 99.7                      | 98.7  | 98.6   |
| 2007 | 105  | 1831  | 37.1                                 | 81.0                        | 99.9                       | 99.8                      | 97.5  | 98.2   |
| 2008 | 104  | 1705  | 35.5                                 | 71.8                        | 99.9                       | 99.9                      | 97.4  | 98.7   |
| 2009 | 100  | 1467  | 27.9                                 | 60.4                        | 99.9                       | 99.9                      | 97.2  | 98.7   |
| 2010 | 93   | 1505  | 30.6                                 | 64.5                        | 99.7                       | 99.8                      | 97.6  | 98.1   |
| 2011 | 88   | 1506  | 32.6                                 | 72.2                        | 99.8                       | 99.7                      | 95.9  | 98.2   |
| 2012 | 85   | 1459  | 29.7                                 | 62.2                        | 99.7                       | 99.8                      | 98.3  | 98.6   |
| 2013 | 81   | 1482  | 29.0                                 | 62.0                        | 99.9                       | 99.8                      | 96.2  | 98.3   |
| 2014 | 81   | 1428  | 28.2                                 | 62.4                        | 99.9                       | 99.8                      | 97.5  | 97.9   |
| 2015 | 77   | 1367  | 26.4                                 | 53.8                        | 99.9                       | 99.9                      | 97.6  | 98.5   |
| 2016 | 77   | 1366  | 24.5                                 | 49.8                        | 99.9                       | 99.9                      | 97.3  | 97.9   |
| 2017 | 77   | 1352  | 24.8                                 | 51.2                        | 99.9                       | 99.9                      | 97.5  | 98.7   |
| 2018 | 77   | 1353  | 26.2                                 | 53.8                        | 99.9                       | 99.9                      | 98.3  | 98.5   |
| 2019 | 77   | 1310  | 24.8                                 | 52.4                        | 99.9                       | 99.9                      | 97.8  | 98.0   |
| 2020 | 74   | 1232  | 21.9                                 | 45.6                        | 99.9                       | 99.9                      | 97.4  | 98.7   |

<sup>1</sup> This refers to mills depositing effluent directly into water frequented by fish

## SECTION 1: COMPLIANCE OF DIRECT DEPOSIT MILLS SUBJECT TO THE PPER IN 2020

Analysis of the self-reported effluent data generated during 2020 by Canadian pulp and paper mills concluded that mills continued to have high rates of compliance with the effluent quality limits prescribed in the PPER. In 2020, compliance rates calculated from self-reported data were over 99% for SS and BOD, and 97.4% for the requirement that effluent not be acutely lethal to rainbow trout. Although not a regulatory compliance parameter, the effect on *Daphnia magna* test is reported. Should a *Daphnia magna* test be failed, a mill is then required to perform an additional acute lethality test. The percentage of passed tests for effect on *Daphnia magna* was 98.7%. Figure 2 shows compliance for effluent parameters in 2020, and Figure 3 shows compliance for effluent parameters from 2006 - 2020.

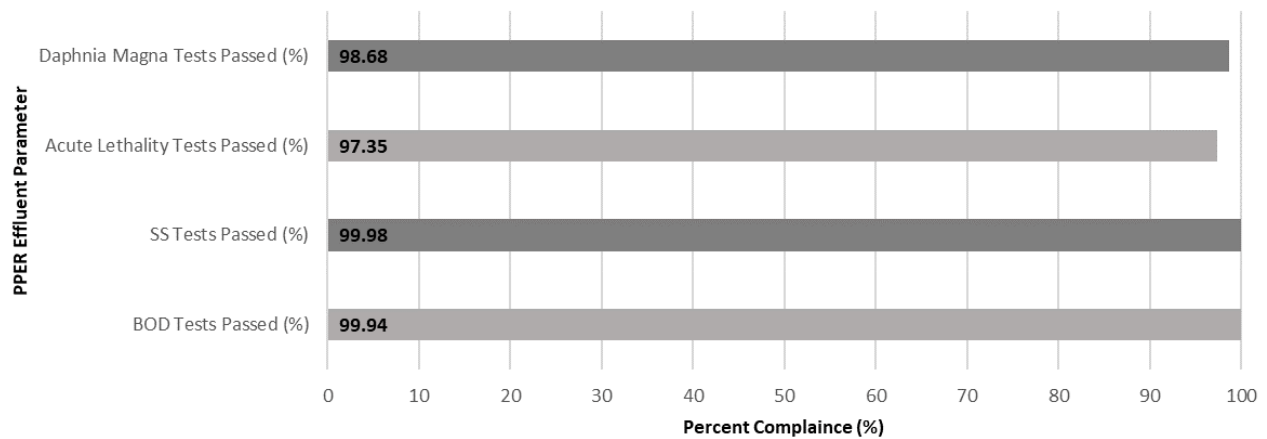


Figure 2: PPER Effluent Parameter Compliance (2020)

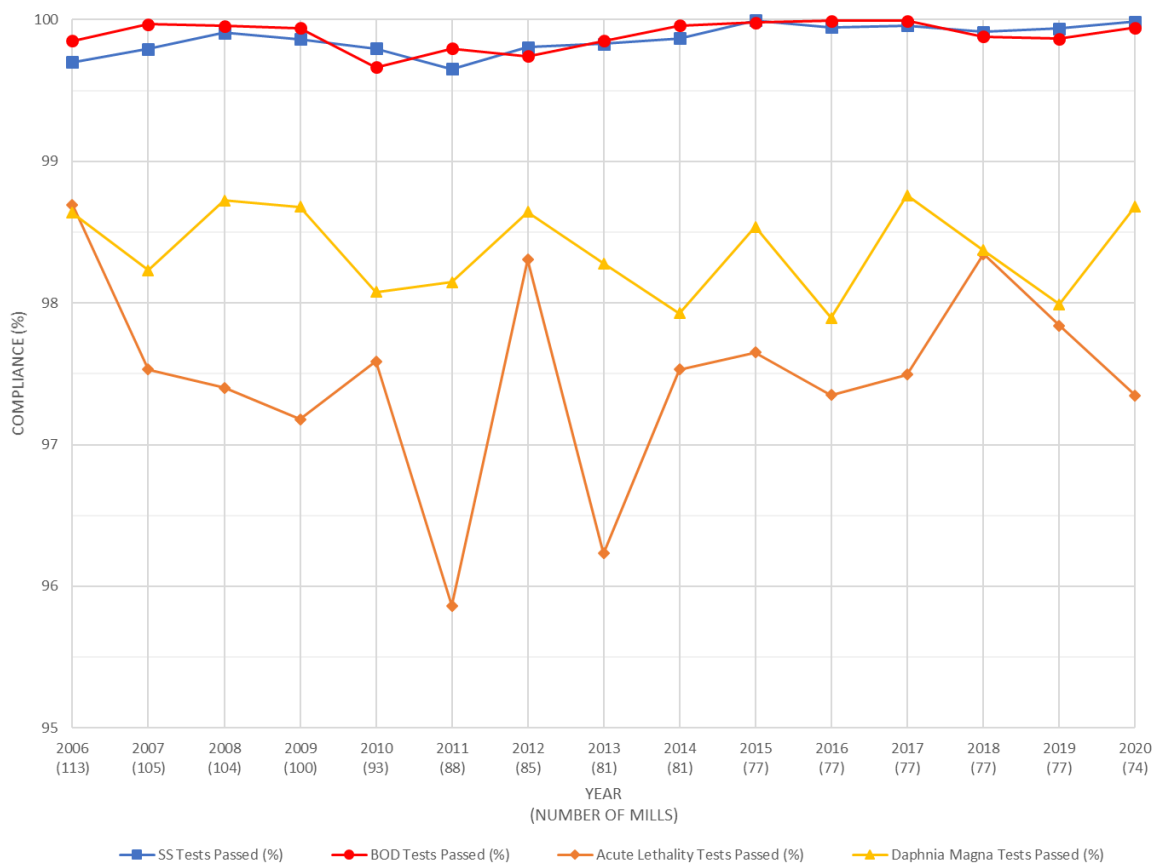
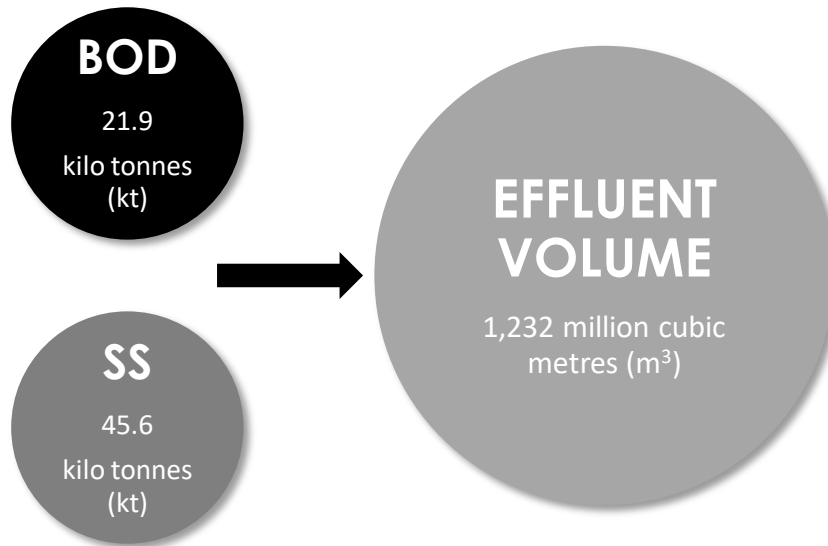


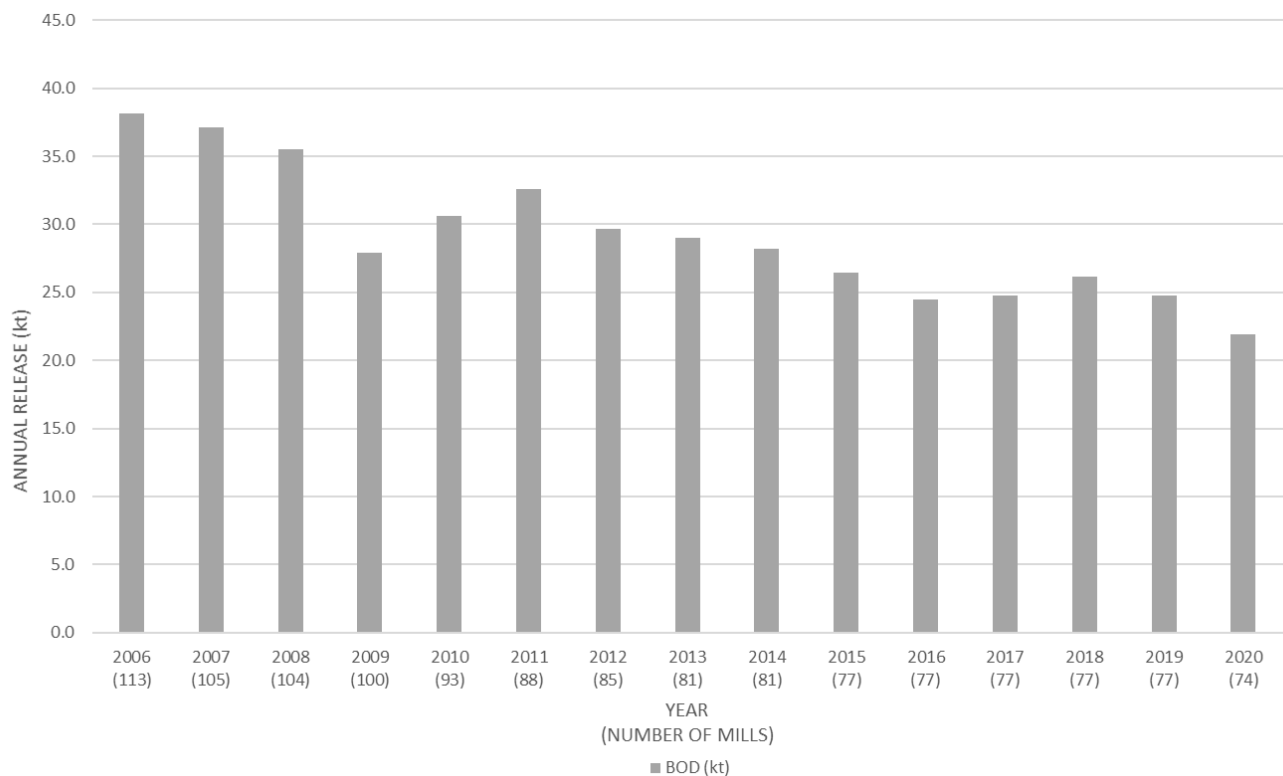
Figure 3: PPER Effluent Parameter Compliance over Time (2006 - 2020)

## SECTION 2: REGULATORY DATA SUMMARY OF DIRECT DEPOSIT MILLS SUBJECT TO THE PPER IN 2020

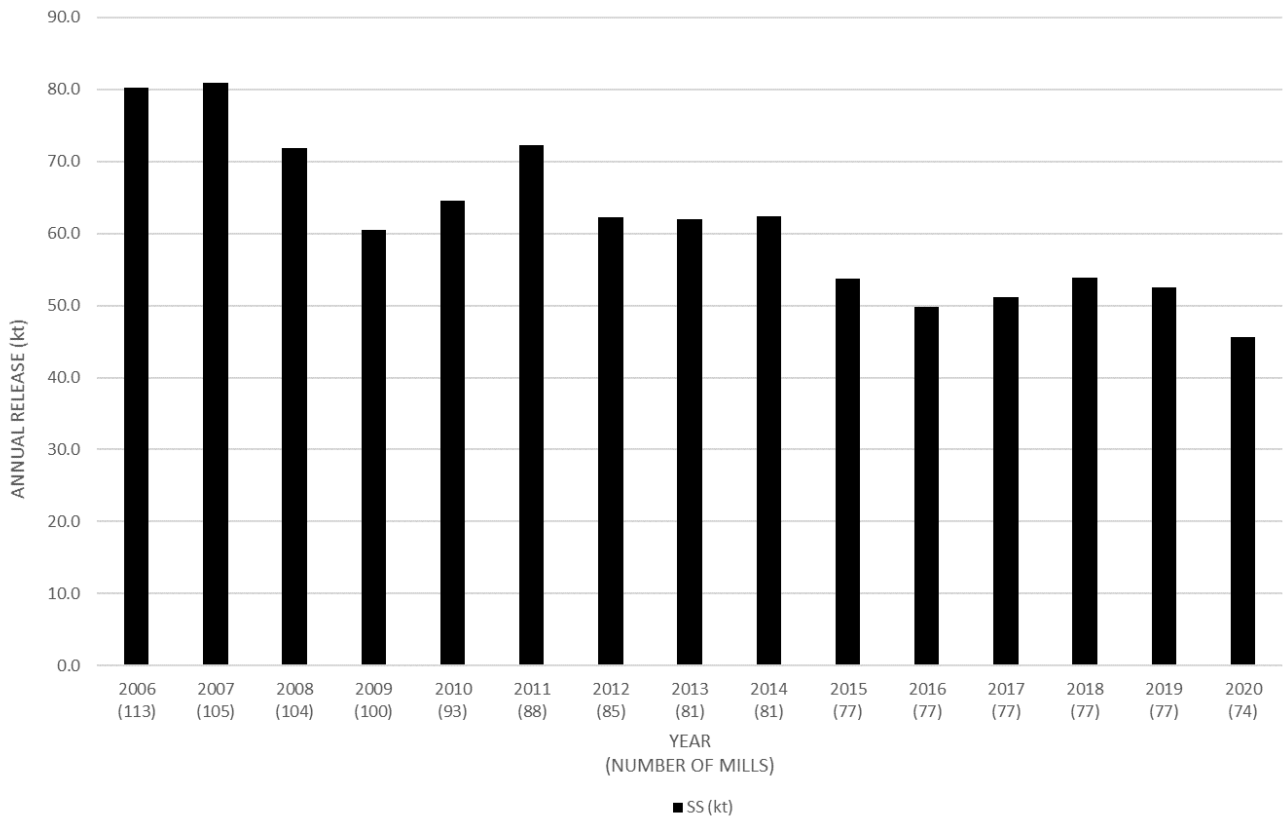
Analysis of the self-reported effluent data generated during 2020 by Canadian pulp and paper mills showed mills deposited 1,232 million cubic metres of effluent, 45.6 kilotonnes of suspended solids and 21.9 kilotonnes of BOD matter. Figure 4 illustrates total releases from all Canadian mills in 2020. Figures 5 and 6 below demonstrate the total annual release of BOD and SS by Canadian pulp and paper mill effluent at the national level from 2006 to 2020.



**Figure 4:** Total Deleterious Substances and Effluent Deposited by Canadian Mills Subject to the PPER in 2020

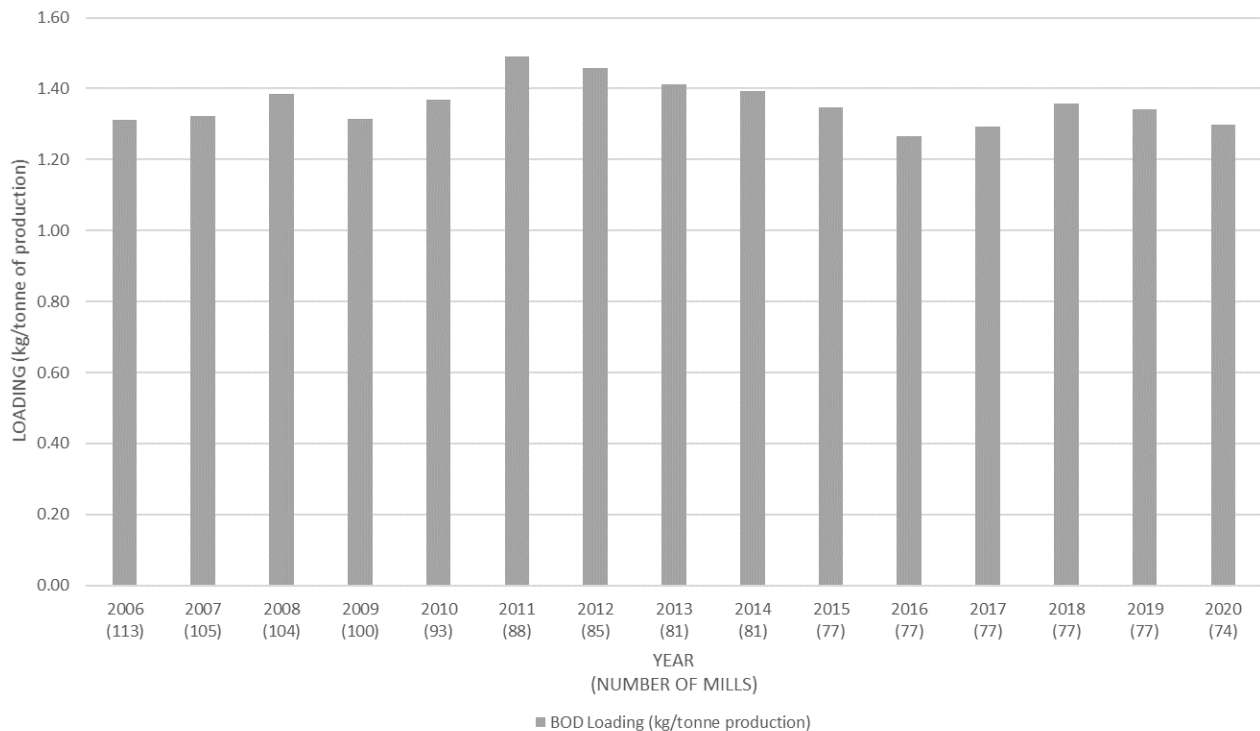


**Figure 5:** Annual Release of BOD by Canadian Pulp and Paper Mill Effluent over Time (2006 – 2020)

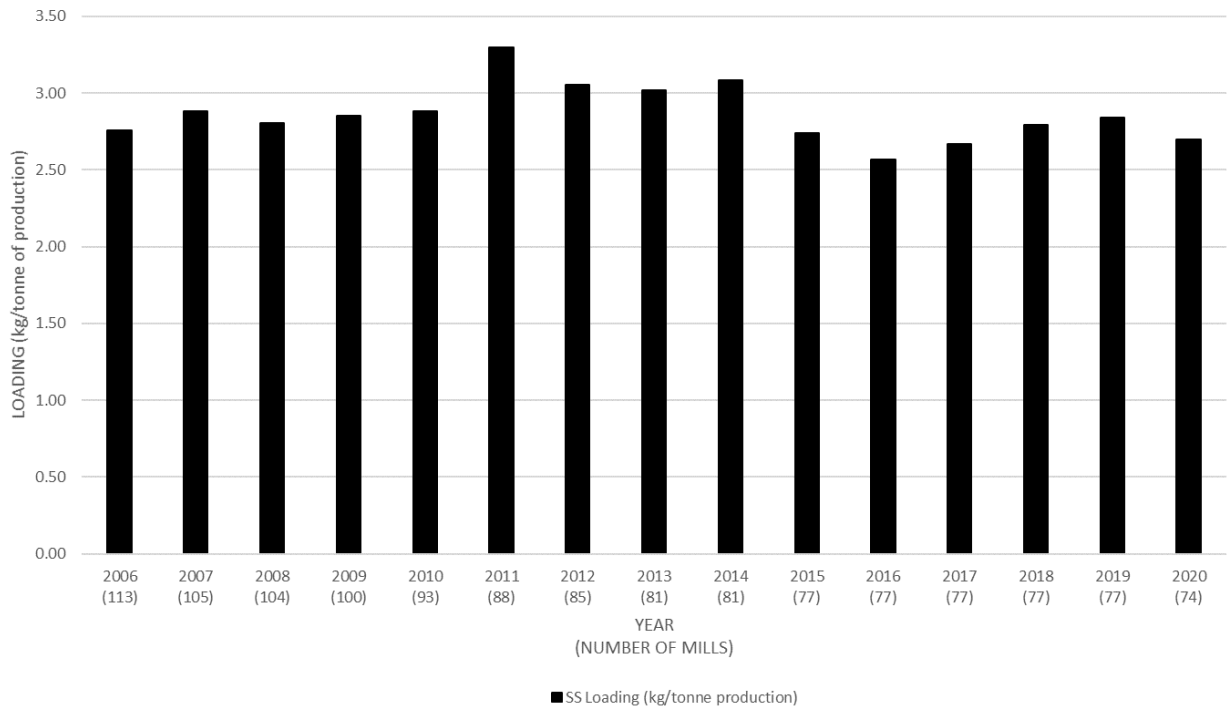


**Figure 6:** Annual Release of SS by Canadian Pulp and Paper Mill Effluent over Time (2006 – 2020)

Figures 7 and 8 demonstrates the annual effluent loading, kilograms of BOD and SS released per tonne of production, in Canadian pulp and paper mill effluent at the national level from 2006 to 2020.

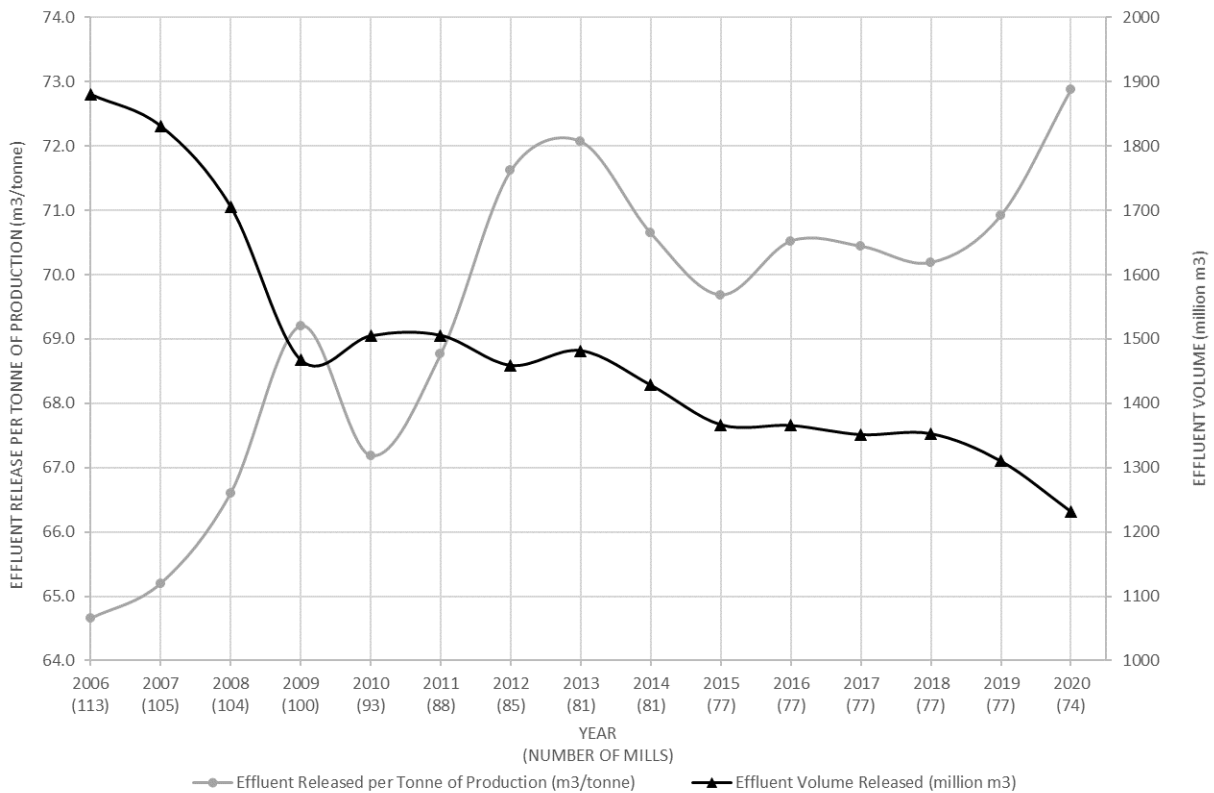


**Figure 7:** Annual Loading of BOD by Canadian Pulp and Paper Mill Effluent over Time (2006 – 2020)



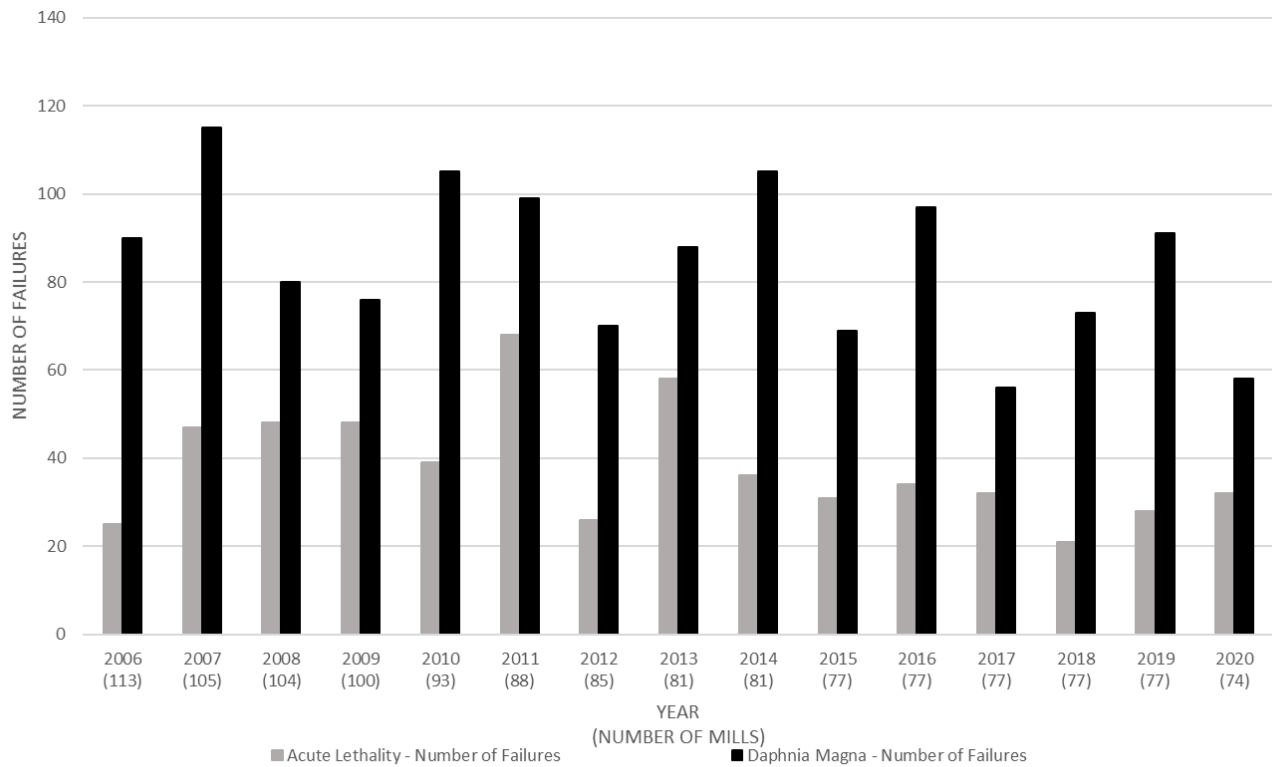
**Figure 8: Annual Loading of SS by Canadian Pulp and Paper Mill Effluent over Time (2006 – 2020)**

Figure 9 demonstrates both the effluent volume released on an annual basis (effluent efficiency) by Canadian pulp and paper mills, compared to the total effluent volume released per tonne of production of all Canadian pulp and paper mills from 2006 to 2020. Effluent volume has decreased since 2006, and effluent volume per tonne of production has increased.



**Figure 9: Total Effluent Volume and Total Effluent Released Per Tonne of Production by Canadian Pulp and Paper Mills over Time (2006 – 2020)**

Figure 10 represents the total number of instances where effluent was found to be acutely lethal to rainbow trout, and the total number of times effluent had an effect on *Daphnia magna* by Canadian pulp and paper mill effluent from 2006 to 2020.



**Figure 10:** Total Number of Failures of Acute Lethality (Rainbow Trout) and *Daphnia Magna* Testing By Canadian Pulp and Paper Mill Effluent over Time (2006 – 2020)



## SECTION 3: ENVIRONMENTAL EFFECTS MONITORING RESULTS

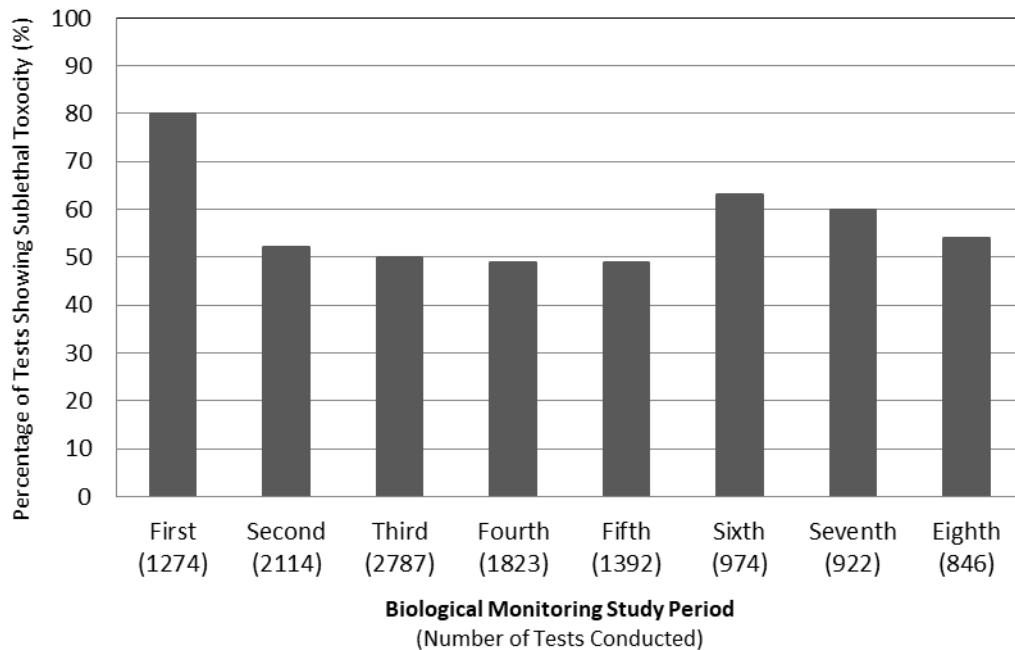
Environmental effects monitoring (EEM) is a science-based, performance measurement tool used to collect information for assessing the effectiveness of effluent regulations in achieving objectives of protecting water quality that sustains fish, fish habitat, and the use of fisheries resources. The EEM requirements in the PPER consists of sublethal toxicity testing of mill final effluent and biological monitoring studies conducted to assess potential impacts of effluent on receiving environments and to determine the cause of and identify solutions for any observed impacts. Information gained through sublethal toxicity testing supports the interpretation of biological monitoring study results. Biological monitoring studies are presently conducted every three years over a period of three years, and there have been eight study periods since the EEM requirements came into force in 1992. Data obtained through PPER EEM requirements from all eight study periods are summarized below and more detailed information for each mill is listed in Appendix C.

**TABLE 2: BIOLOGICAL STUDY MONITORING PERIODS FOR EEM**

| FIRST       | SECOND      | THIRD       | FOURTH      | FIFTH       | SIXTH       | SEVENTH     | EIGHTH      |
|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 1992 - 1996 | 1996 - 2000 | 2000 - 2004 | 2004 - 2007 | 2007 - 2010 | 2010 - 2013 | 2013 - 2016 | 2016 - 2019 |

### SUBLETHAL TOXICITY OF FINAL EFFLUENT

Mills are required to conduct sublethal toxicity (SLT) testing on final effluent. These tests assess the non-lethal (sublethal) impacts of effluent on growth and reproduction. The measurement used to assess sublethal impacts is the effluent concentration that causes a 25% reduction in growth or reproduction in test organisms, known as the *inhibiting concentration* (IC<sub>25</sub>). If a 100% concentration of effluent causes less than a 25% inhibition, the effluent is reported as showing no sublethal toxicity for that test. Starting in 1992, sublethal toxicity testing has been conducted twice a year by all Canadian mills in production or once a year if the mill released effluent on fewer than 120 days in that calendar year. Figure 11 depicts the percentage of sublethal toxicity tests conducted during each of the biological monitoring study periods where sublethal toxicity was reported.



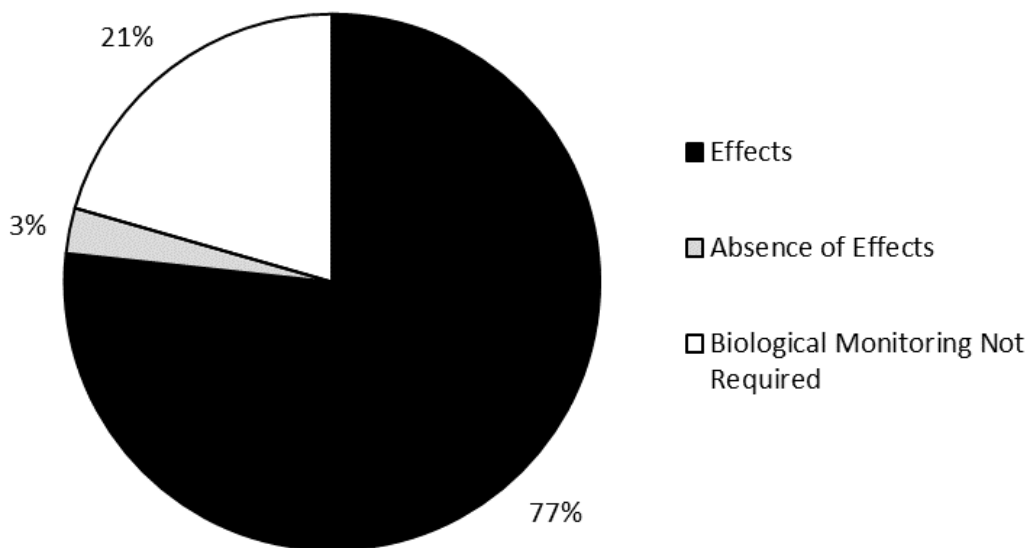
**Figure 11: Percentage of Tests Showing Sublethal Toxicity during Each Biological Monitoring Study Period (Number of Tests Conducted)<sup>2</sup>**

<sup>2</sup>Chart represents all SLT testing conducted on algae, invertebrates and fish.

## BIOLOGICAL MONITORING STUDIES

Biological monitoring studies are conducted to assess and investigate<sup>3</sup> effects in three components: fish health, fish habitat and human usability of fisheries resources. To assess effects of mill effluent on fish health and/or habitat, biological monitoring studies are conducted to compare statistical differences between data collected in an area exposed to mill effluent to data from a similar area not exposed to mill effluent.<sup>4</sup> For human usability of fisheries resources, fish tissue data from the exposure area are assessed against an established threshold for chlorinated dioxins and furans. If mill effluent has an effect on any one or more of the three components, the biological monitoring studies determine the cause of the effect and then identify solutions to eliminate the effect.

Data from all eight biological monitoring study periods have been reviewed. Figure 12 depicts the percentage of these mills for which effluent is designated as showing effects or showing an absence of effects based on all studies conducted as of 2019. A percentage of mills are not required to conduct biological monitoring studies because the mill's effluent dilutes to less than 1% at a distance of 100 meters from where the effluent is released into the environment.



**Figure 12:** Percent Effects Designation for Canadian Mills in Operation (As of 2019)<sup>5</sup>

The prevalent effects on fish are due to more nutrients in the receiving environment, sometimes combined with an effect on reproduction (reduced fish gonad size). The prevalent effects on fish habitat, measured by assessing benthic invertebrate communities, are associated with eutrophication from nutrient enrichment.

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<sup>3</sup> For a summary of EEM studies investigating the cause of and solutions for observed effects, see the [Sixth National Assessment of Environmental Effects Monitoring Data from Pulp and Paper Mills Subject to the Pulp and Paper Effluent Regulations](#)

<sup>4</sup> For more detail on biological monitoring effects, please consult the [Pulp and Paper Effluent Regulations](#)

<sup>5</sup> Includes effects on fish health and fish habitat components based on the most recent one or two studies conducted at each mill. One mill has an effect on human usability of fisheries resources.

## APPENDIX A: OVERVIEW OF CANADIAN DIRECT DEPOSIT MILLS SUBJECT TO THE PPER (2020)

| ID   | COMPANY: MILL NAME                                    | LOCATION   | PROVINCE | NUMBER OF OUTFALLS | OUTFALL NAME  | RECEIVING ENVIRONMENT <sup>6</sup> |
|------|---|--|----------|--------------------|---|------------------------------------|
| QC01 | Sappi: Matane, QC                                     | 400 Rue du Port, Matane, G4W 3P6                       | Quebec   | 1                  | Final Effluent - Biological Treatment   | Saint-Lawrence River               |
| QC02 | Papiers White Birch - F.F. Soucy: Riviere-du-Loup, QC | 191 Delage Street, Rivière-du-Loup, G5R 6E2            | Quebec   | 1                  | Final Effluent - 1 - EF   | Rivière Du Loup                    |
| QC03 | Cascades: Cabano, QC                                  | 520 Rue Commerciale N, Témiscouata-sur-le-Lac, G0L 1E0 | Quebec   | 1                  | Final Effluent - Mix of 2 Effluents: biologically treated and untreated process water   | Cabano River                       |
| QC04 | Resolute Forest Products: Alma, QC                    | 1100 Melancon West Street, Alma, G8B 5R7               | Quebec   | 1                  | Final Effluent  | Petite Décharge River              |
| QC05 | Resolute Forest Products: Kénogami, QC                | 3750 Champlain Street, Jonquière, G7S 5J7              | Quebec   | 1                  | Final Effluent - 1  | Saguenay River                     |
| QC06 | Fibrek : Saint-Félicien, QC                           | 4000 Rte. St. Eusebe, St. Félicien, G8K 2R6            | Quebec   | 7                  | Final Effluent - Ashuapmushaun River (site 61) with combination<br>Final Effluent - Ashuapmushaun River (site 61) without combination<br>Final Effluent - Mistassini River (site 01) with combination<br>Final Effluent - Mistassini River (site 01) without combination<br>Final Effluent Cooling Water - Ashuapmushaun River (site 61)<br>Non-treated Effluent (site 21)<br>Treated Effluent - Biological Treatment (site 11) | Mistassini & Ashuapmushuan Rivers  |
| QC07 | Resolute Forest Products: Dolbeau, QC                 | 1, 4e Avenue, Dolbeau, G8L 2R4                         | Quebec   | 1                  | Final Effluent  | Mistassini River                   |
| QC08 | BP Canada: Pont Rouge, QC                             | 420 Rue Dupont, Pont Rouge, G3H 1S2                    | Quebec   | 1                  | Final Effluent  | Jacques-Cartier River              |
| QC09 | MPI Moulin: Portneuf, QC                              | 200 Rue du Moulin, Portneuf, G0A 2Y0                   | Quebec   | 1                  | Final Effluent  | Portneuf River                     |

<sup>6</sup> Environment in which the effluent is deposited post treatment

| ID   | COMPANY: MILL NAME                                 | LOCATION  | PROVINCE | NUMBER OF OUTFALLS | OUTFALL NAME  | RECEIVING ENVIRONMENT <sup>6</sup> |
|------|--|---|----------|--------------------|---|------------------------------------|
| QC10 | Papiers White Birch: Stadacona, QC                 | 10 Boulevard des Capucins, Stadacona, G1J 3R4           | Quebec   | 1                  | Final Effluent  | Saint-Lawrence River               |
| QC11 | Resolute Forest Products: Clermont, QC             | 100 Rue Donohue, Clermont, G4A 1A7                      | Quebec   | 1                  | Final Effluent  | Malbaie River                      |
| QC12 | Cascades: Kingsey Falls, QC                        | 467 Boulevard Marie-Victorin, Kingsey Falls, J0A 1B0    | Quebec   | 1                  | Final Effluent  | Nicolet River                      |
| QC14 | Westrock: La Tuque, QC                             | 1000 Chemin De L'Usine, La Tuque, G9X 3P8               | Quebec   | 1                  | Final Effluent - 1 EF   | St-Maurice River                   |
| QC15 | Kruger - Wayagamack: Trois-Rivières, QC            | Chemin de l'île-de-la-Potherie, Trois-Rivières, G9A 5E9 | Quebec   | 3                  | Final Effluent - Outfall #1<br>Final Effluent - Outfall #5<br>Final Effluent - Biological Treatment                                       | Saint-Lawrence & St-Maurice River  |
| QC16 | Kruger: Trois-Rivières, QC                         | 3735 Blvd Gene H. Kruger, Trois-Rivières, G9A 6B1       | Quebec   | 1                  | Final Effluent  | Saint-Lawrence River               |
| QC17 | Domtar: Windsor, QC                                | 609 12e Rang, Windsor, J1S 2L9                          | Quebec   | 1                  | Final Effluent  | Saint-François River               |
| QC18 | Kruger: Brompton, QC                               | 220 route de Windsor, Sherbrooke, J1C 0E6               | Quebec   | 1                  | Final Effluent  | Saint-François River               |
| QC19 | Kruger: Sherbrooke, QC                             | 2888 Rue du College, Sherbrooke, J1M 1Z4                | Quebec   | 1                  | Final Effluent  | Massawippi River                   |
| QC20 | Resolute Forest Products: Gatineau, QC             | 79 Rue Main, Gatineau, J8P 4C8                          | Quebec   | 1                  | Final Effluent  | Ottawa River                       |
| QC21 | Papiers White Birch - Papiers Masson: Gatineau, QC | 2 Chemin de Montréal O, Gatineau, J8M 1A4               | Quebec   | 1                  | Final Effluent  | Ottawa River                       |
| QC22 | Fortress Specialty Cellulose: Thurso, QC           | 451 Rue Victoria, Thurso, J0X 3B0                       | Quebec   | 1                  | Final Effluent  | Ottawa River                       |
| QC23 | Kruger: Gatineau, QC                               | 20 Laurier St, Gatineau, J8X 4H3                        | Quebec   | 1                  | Final Effluent  | Ottawa River                       |
| QC24 | Resolute Forest Products: Amos, QC                 | 801 Rue des Papetiers, Amos, J9T 3X5                    | Quebec   | 1                  | Final Effluent  | Harricana River                    |
| QC25 | Rayonier: Témiscaming, QC                          | 33 Chemin Kipawa, Témiscaming, J0Z 3R0                  | Quebec   | 3                  | Final Effluent - North-South (4EF)<br>Final Effluent - Biological Treatment (3-EF)<br>Final Cooling Water Effluent - Gordon Creek (61-ER) | Ottawa River                       |

| ID   | COMPANY: MILL NAME                           | LOCATION   | PROVINCE      | NUMBER OF OUTFALLS | OUTFALL NAME  | RECEIVING ENVIRONMENT <sup>6</sup>                     |
|------|--|--|---------------|--------------------|---|--|
| QC26 | Resolute Forest Products: Baie-Comeau, QC    | 20 Avenue Marquette , Baie Comeau, G4Z 1K6             | Quebec        | 1                  | Final Effluent  | Saint-Lawrence River                                   |
| QC27 | Nordic Kraft: Lebel-sur-Quévillon, QC        | 30 Chemin du Moulin, Lebel-sur-Quévillon, J0Y 1X0      | Quebec        | 2                  | Final Effluent - 01 - EF<br>Final Cooling Water Effluent - 01             | Quévillon River  |
| QC28 | Sustana Fiber: Breakyville, QC               | 3805 St. Augustin Avenue, Breakeyville, G0S 1E2        | Quebec        | 1                  | Final   | Chaudière River  |
| QC29 | Kruger: Crabtree, QC                         | 100 1re Av, Crabtree, J0K 1B0                          | Quebec        | 1                  | Final Effluent Municipal Treatment  | Ouareau River  |
| QC30 | Cascades: Lachute, QC                        | 115 Rue Princesse, Lachute, J8H 4M3                    | Quebec        | 2                  | Final Effluent - with Combination<br>Final Effluent - without Combination | Rivière Du Nord  |
| QC31 | Enterprises Rolland: St. Jerome, QC          | 256 Jean-Baptiste-Rolland Blvd., Saint-Jerome, J7Y 3Z7 | Quebec        | 1                  | Final Effluent  | Rivière Du Nord  |
| AB01 | Alberta Newsprint: Whitecourt, AB            | Postal Bag 9000 10km West, Hwy 43, Whitecourt, T7S 0A1 | Alberta       | 1                  | Polishing Basin Outlet (Pumphouse)  | Athabasca River  |
| AB02 | Alberta Pacific Forest Industries: Boyle, AB | Range Road 195A, Boyle, T0A 0M0                        | Alberta       | 1                  | PF-140119   | Athabasca River  |
| AB03 | Mercer Celgar: Peace River, AB               | 1 Pulp Mill Site Road, Peace River, T8S 1V7            | Alberta       | 2                  | Post Aeration Chamber (PAC)<br>Combined Chiller-Cooling Water             | Peace River  |
| AB05 | Millar Western: Whitecourt, AB               | 5004 52 St, Whitecourt, T7S 1N2                        | Alberta       | 2                  | 218 Final Effluent<br>Non-Contact Cooling Water (NCCW)                    | Athabasca River  |
| AB06 | West Fraser: Slave Lake, AB                  | East, W Mitsue Ind Rd, Slave Lake, T0G 2A0             | Alberta       | 1                  | Reaeration Discharge  | Lesser Slave River                                     |
| AB07 | International Paper: Grande Prairie, AB      | Grande Prairie County No. 1, Grande Prairie, T8V 3A9   | Alberta       | 1                  | Final Effluent Outfall  | Wapiti River   |
| AB08 | West Fraser: Hinton, AB                      | 760 Switzer Drive, Hinton, T7V 1V7                     | Alberta       | 1                  | Combined Final Effluent   | Athabasca River  |
| MB02 | Canadian Kraft Paper Industries: The Pas, MB | MB-285, The Pas, R9A 1L4                               | Manitoba      | 1                  | Lagoon Outfall  | Saskatchewan River                                     |
| NB01 | AV Group: Atholville, NB                     | 175 Mill Ch., Atholville, E3N 4S7                      | New Brunswick | 3                  | Final Effluent Parshall Flume<br>Storm Sewer East<br>Storm Sewer South    | Restigouche River                                      |
| NB03 | Twin Rivers Paper: Edmunston, NB             | 27 Rue Rice, Edmunston, E3V 1S9                        | New Brunswick | 3                  | Final Effluent<br>Groundwood Mill Grinder<br>Surface Condenser            | Saint John River<br>Madawaska River<br>Madawaska River |

| ID   | COMPANY: MILL NAME                         | LOCATION  | PROVINCE      | NUMBER OF OUTFALLS | OUTFALL NAME   | RECEIVING ENVIRONMENT <sup>6</sup>            |
|------|--|---|---------------|--------------------|--|---|
| NB06 | Irving (Paper): Saint John, NB             | 435 Bayside Drive, Saint John, E2J 1B2                      | New Brunswick | 3                  | ASB Final to Courtenay Bay<br>Chip Yard Storm Sewer<br>Wetwell Emergency Outfall | Courtenay Bay                                 |
| NB07 | Irving (Pulp and Paper): Saint John, NB    | 408 Mill Road, Saint John, E2M 3H1                          | New Brunswick | 5                  | Cooling Water<br>Finishing Room<br>Hog and Press<br>Main Mill<br>Tissue Mill     | Saint John River                              |
| NB08 | Irving: Lake Utopia, NB                    | 600 NB-785, Utopia, E5C 2K4                                 | New Brunswick | 1                  | Parshall Flume   | L'Étang Estuary                               |
| NB09 | AV Group: Nackawic, NB                     | 103 Pinder Road, Nackawic, E6G 1W4                          | New Brunswick | 1                  | Effluent Discharge to Saint John River   | Saint John River                              |
| NF03 | Kruger: Corner Brook, NF                   | 1 Mill Road, Corner Brook, A2H 6B9                          | Newfoundland  | 3                  | Combined West Sewer<br>East Sewer<br>Main AST Outfall                            | Humber Arm                                    |
| NS01 | Maibec: East River, NS                     | 2005 Highway 3, East Chester, B0J 1T0                       | Nova Scotia   | 1                  | Rous Point   | Little East River                             |
| NS03 | CKF Incorporated: Hansport, NS             | 48 Prince Street, Hansport, B0P 1P0                         | Nova Scotia   | 1                  | CKF Outfall  | Avon River                                    |
| NS04 | Paper Excellence: Northern Pulp, NS        | 260 Granton Abercrombie Branch Road, Pictou County, B2H 5E8 | Nova Scotia   | 2                  | Northern Pulp Nova Scotia Outfall (Point C)<br>Point D                           | Boat Harbour Basin<br>Northumberland Straight |
| NS06 | Port Hawkesbury Paper: Port Hawkesbury, NS | 120 Pulp Mill Road, Port Hawkesbury, B9A 1A1                | Nova Scotia   | 2                  | Clearwell<br>Main  | Strait Of Canso                               |
| ON05 | Domtar: Dryden, ON                         | 1 Duke Street, Dryden, P8N 2Z7                              | Ontario       | 3                  | Final Effluent<br>Pumphouse Cooling Water<br>Standpipe Creek Cooling Water       | Wabigoon River                                |
| ON06 | Resolute Forest Products: Thunder Bay, ON  | 2001 Neebing Avenue, Thunder Bay, P7E 6S3                   | Ontario       | 3                  | Combined Mill<br>Kraft Clean Water<br>News Clean Water                           | Kaministiquia River                           |

| ID   | COMPANY: MILL NAME                    | LOCATION                                       | PROVINCE         | NUMBER OF OUTFALLS | OUTFALL NAME   | RECEIVING ENVIRONMENT <sup>6</sup> |
|------|---------------------------------------|--|------------------|--------------------|--|------------------------------------|
| ON07 | Resolute Forest Products: Thorold, ON | 2 Allanburg Road, Thorold, L2V 3Z5             | Ontario          | 1                  | Combined Effluent  | Welland Canal                      |
| ON11 | Cascades: Trenton, ON                 | 300 Marmora Street, Trenton, K8V 5R8           | Ontario          | 1                  | Total Mill Effluent  | Trent River                        |
| ON12 | Domtar: Espanola, ON                  | 1 Station Road, Espanola, P5E 1R6              | Ontario          | 2                  | Main Sewer<br>Warm Water Tank Overflow   | Spanish River                      |
| ON15 | Dunn Paper: St. Catharines, ON        | 45 Merritt Street, St. Catharines, L2T 1J4     | Ontario          | 1                  | Polishing Basin  | Welland Canal                      |
| ON17 | AV Group: Terrace Bay, ON             | 21 Mill Road, Terrace Bay, P0T 2W0             | Ontario          | 3                  | Backflush<br>Cooling Water<br>Final Effluent   | Lake Superior                      |
| ON21 | Rayonier: Kapuskasing, ON             | 1 Government Road E, Kapuskasing, P5N 2Y2      | Ontario          | 1                  | Combined Effluent Outfall  | Kapuskasing River                  |
| ON23 | Sonoco: Trent Valley, ON              | Trenton Frankford Road, Trenton, K0K 2C0       | Ontario          | 1                  | Final Effluent   | Trent River                        |
| ON24 | Strathcona Paper: Napanee, ON         | 77 County Road 16 R.R. #7, Napanee, K7R 3L2    | Ontario          | 4                  | Boiler Room Raw Water Drain (Cooling Water #2)<br>Cooling Water (CW1)<br>Final Process Effluent<br>Raw Water Drain (Cooling Water #1)  | Napanee River                      |
| PY01 | Catalyst: Crofton, BC                 | 8541 Hay Road, Crofton, V0R 1R0                | British Columbia | 2                  | Catalyst Paper (1) at Crofton<br>Catalyst Paper (2) at Crofton   | Stuart Channel                     |
| PY02 | Paper Excellence: Howe Sound, BC      | 3838 Port Mellon Highway, Port Mellon, V0N 2S0 | British Columbia | 2                  | Howe Sound Pulp and Paper (1) at Port Mellon<br>Howe Sound Pulp and Paper (2) at Port Mellon   | Thornbrough Channel                |
| PY05 | Catalyst: Port Alberni, BC            | 4000 Stamp Avenue, Port Alberni, V9Y 5J7       | British Columbia | 1                  | Catalyst Paper at Port Alberni   | Alberni Inlet                      |
| PY07 | Catalyst: Powell River, BC            | 5775 Ash Avenue, Powell River, V8A 4R3         | British Columbia | 5                  | Catalyst Paper (1) at Powell River<br>Catalyst Paper (2) at Powell River<br>Catalyst Paper (3) at Powell River<br>Catalyst Paper (4) at Powell River<br>Catalyst Paper (5) at Powell River (Virtual) | Malaspina Strait                   |



| ID   | COMPANY: MILL NAME                         | LOCATION   | PROVINCE         | NUMBER OF OUTFALLS | OUTFALL NAME                               | RECEIVING ENVIRONMENT <sup>6</sup> |
|------|--|--|------------------|--------------------|--|------------------------------------|
| PY12 | Paper Excellence: Mackenzie, BC            | 1000 Coquawaldy Road, Mackenzie, V0J 2C0                 | British Columbia | 2                  | MacKenzie Pulp (1) at MacKenzie            | Williston Lake                     |
|      |  |  |                  |                    | MacKenzie Pulp (2) at MacKenzie            | Williston Lake                     |
| PY13 | Cariboo Pulp and Paper: Quesnel, BC        | 50 North Star Road, Quesnel, V2J 3J6                     | British Columbia | 1                  | Cariboo Pulp and Paper at Quesnel          | Fraser River                       |
| PY14 | Paper Excellence: Skookumchuck, BC         | 4501 Farstad Way, Skookumchuck, V0B 2E0                  | British Columbia | 1                  | Tembec Pulp and Paper at Skookumchuck      | Kootenay River                     |
| PY17 | Canfor - Northwood Pulp: Prince George, BC | 5353 Northwood Pulp Road, Prince George, V2L 4W2         | British Columbia | 1                  | Northwood Pulp and Timber at Prince George | Fraser River                       |
| PY18 | Mercer Celgar: Castlegar, BC               | 1921 Arrow Lakes Drive, Castlegar, V1N 3H9               | British Columbia | 1                  | Celgar Pulp at Castlegar                   | Columbia River                     |
| PY19 | Canfor - PGI: Prince George, BC            | 2533 Prince George Pulpmill Road, Prince George, V2N 2K3 | British Columbia | 1                  | Canadian Forest Products at Prince George  | Fraser River                       |
| PY20 | Quesnel River Pulp: Quesnel, BC            | 1000 Finning Road, Quesnel, V2J 6A1                      | British Columbia | 1                  | Quesnel River Pulp at Quesnel              | Fraser River                       |
| PY21 | Kruger: New Westminster, BC                | 1625 5th Avenue, New Westminster, V3M 1Z7                | British Columbia | 1                  | Kruger Products Limited at New Westminster | Fraser River Estuary               |
| PY22 | Domtar: Kamloops, BC                       | 2005 Mission Flats Road, Kamloops, V2C 1A9               | British Columbia | 1                  | Domtar at Kamloops                         | Thompson River                     |
| PY25 | Canfor: Taylor, BC                         | 8300 Cherry Avenue East, Taylor, V0C 2K0                 | British Columbia | 1                  | Taylor Pulp and Paper at Taylor            | Peace River                        |
| PY26 | Nanaimo Forest Products: Harmac, BC        | 1000 Wave Place, Nanaimo, V9X 1J2                        | British Columbia | 1                  | Harmac Pulp at Nanaimo                     | Northumberland Channel             |

## APPENDIX B: ANNUAL EFFLUENT DATA FOR CANADIAN DIRECT DEPOSIT MILLS SUBJECT TO THE PPER (2020)

| ID   | MILL NAME   | ANNUAL EFFLUENT FLOW (1000 m <sup>3</sup> ) | ANNUAL SS (tonnes) | ANNUAL BOD (tonnes) | ANNUAL DAPHNIA MAGNA FAILURES | ANNUAL DAPHNIA MAGNA TESTS | ANNUAL ACUTE LETHALITY FAILURES | ANNUAL ACUTE LETHALITY TESTS |
|------|---|---|--------------------|---------------------|-------------------------------|----------------------------|---------------------------------|------------------------------|
| QC01 | Rayonier: Matane, QC                                  | 7022  | 209                | 95                  | 0                             | 50                         | 0                               | 12                           |
| QC02 | Papiers White Birch - F.F. Soucy: Riviere-du-Loup, QC | 4266  | 218                | 107                 | 2                             | 44                         | 0                               | 10                           |
| QC03 | Cascades: Cabano, QC                                  | 2430  | 12                 | 11                  | 0                             | 51                         | 0                               | 12                           |
| QC04 | Resolute Forest Products: Alma, QC                    | 12198                                       | 232                | 80                  | 0                             | 52                         | 0                               | 12                           |
| QC05 | Resolute Forest Products: Kénogami, QC                | 5633  | 99                 | 35                  | 0                             | 52                         | 0                               | 12                           |
| QC06 | FibreK : Saint-Félicien, QC                           | 26534                                       | 950                | 820                 | 0                             | 75                         | 0                               | 18                           |
| QC07 | Resolute Forest Products: Dolbeau, QC                 | 6944  | 106                | 26                  | 0                             | 53                         | 0                               | 12                           |
| QC08 | BP Canada: Pont Rouge, QC                             | 587   | 18                 | 7                   | 0                             | 46                         | 0                               | 11                           |
| QC09 | MPI Moulin: Portneuf, QC                              | 733   | 52                 | 49                  | 7                             | 51                         | 2                               | 22                           |
| QC10 | Papiers White Birch: Stadacona, QC                    | 19377                                       | 536                | 387                 | 1                             | 51                         | 0                               | 13                           |
| QC11 | Resolute Forest Products: Clermont, QC                | 7361  | 74                 | 44                  | 4                             | 51                         | 0                               | 12                           |
| QC12 | Cascades: Kingsey Falls, QC                           | 1817  | 9                  | 9                   | 0                             | 51                         | 0                               | 12                           |
| QC14 | Westrock: La Tuque, QC                                | 41287                                       | 1184               | 287                 | 0                             | 53                         | 0                               | 12                           |
| QC15 | Kruger - Wayagamack: Trois-Rivières, QC               | 23439                                       | 703                | 106                 | 0                             | 157                        | 0                               | 37                           |
| QC16 | Kruger: Trois-Rivières, QC                            | 17781                                       | 212                | 59                  | 5                             | 52                         | 0                               | 16                           |
| QC17 | Domtar: Windsor, QC                                   | 24908                                       | 952                | 306                 | 5                             | 54                         | 0                               | 14                           |
| QC18 | Kruger: Brompton, QC                                  | 3015  | 103                | 37                  | 0                             | 50                         | 0                               | 11                           |
| QC19 | Kruger: Sherbrooke, QC                                | 1054  | 44                 | 42                  | 0                             | 52                         | 0                               | 12                           |
| QC20 | Resolute Forest Products: Gatineau, QC                | 15594                                       | 226                | 139                 | 0                             | 54                         | 0                               | 13                           |
| QC21 | Papiers White Birch - Papiers Masson: Gatineau, QC    | 6123  | 126                | 53                  | 0                             | 53                         | 0                               | 12                           |
| QC22 | Fortress Specialty Cellulose: Thurso, QC              | 12178                                       | 62                 | 30                  | 0                             | 40                         | 0                               | 12                           |
| QC23 | Kruger: Gatineau, QC                                  | 5247  | 69                 | 118                 | 0                             | 52                         | 0                               | 12                           |
| QC24 | Resolute Forest Products: Amos, QC                    | 3441  | 47                 | 53                  | 0                             | 47                         | 0                               | 11                           |
| QC25 | Rayonier: Témiscaming, QC                             | 54057                                       | 1084               | 494                 | 0                             | 134                        | 5                               | 48                           |
| QC26 | Resolute Forest Products: Baie-Comeau, QC             | 4976  | 34                 | 16                  | 0                             | 43                         | 0                               | 11                           |
| QC27 | Nordic Kraft: Lebel-sur-Quévillon, QC                 | 9361  | 132                | 66                  | 0                             | 64                         | 0                               | 15                           |
| QC28 | Sustana Fiber: Breakyville, QC                        | 523   | 25                 | 8                   | 5                             | 51                         | 0                               | 15                           |
| QC29 | Kruger: Crabtree, QC                                  | 6958  | 31                 | 47                  | 0                             | 52                         | 0                               | 12                           |
| QC30 | Cascades: Lachute, QC                                 | 339   | 29                 | 14                  | 3                             | 46                         | 0                               | 13                           |
| QC31 | Enterprises Rolland: St. Jerome, QC                   | 2516  | 601                | 152                 | 3                             | 51                         | 0                               | 15                           |

| ID   | MILL NAME                                    | ANNUAL EFFLUENT FLOW (1000 m <sup>3</sup> ) | ANNUAL SS (tonnes) | ANNUAL BOD (tonnes) | ANNUAL DAPHNIA MAGNA FAILURES | ANNUAL DAPHNIA MAGNA TESTS | ANNUAL ACUTE LETHALITY FAILURES | ANNUAL ACUTE LETHALITY TESTS |
|------|--|---|--------------------|---------------------|-------------------------------|----------------------------|---------------------------------|------------------------------|
| AB01 | Alberta Newsprint: Whitecourt, AB            | 5775  | 46                 | 28                  | 0                             | 52                         | 0                               | 12                           |
| AB02 | Alberta Pacific Forest Industries: Boyle, AB | 30353                                       | 662                | 174                 | 0                             | 55                         | 0                               | 15                           |
| AB03 | Mercer Celgar: Peace River, AB               | 26394                                       | 813                | 116                 | 0                             | 107                        | 0                               | 24                           |
| AB05 | Millar Western: Whitecourt, AB               | 5340  | 415                | 143                 | 0                             | 61                         | 0                               | 21                           |
| AB06 | West Fraser: Slave Lake, AB                  | 4398  | 280                | 106                 | 1                             | 52                         | 0                               | 13                           |
| AB07 | International Paper: Grande Prairie, AB      | 15432                                       | 467                | 355                 | 0                             | 52                         | 0                               | 12                           |
| AB08 | West Fraser: Hinton, AB                      | 36570                                       | 1381               | 879                 | 1                             | 51                         | 0                               | 12                           |
| MB02 | Canadian Kraft Paper Industries: The Pas, MB | 13168                                       | 607                | 392                 | 2                             | 56                         | 2                               | 19                           |
| NB01 | AV Group: Atholville, NB                     | 17167                                       | 1221               | 1170                | 0                             | 58                         | 3                               | 23                           |
| NB03 | Twin Rivers Paper: Edmunston, NB             | 21976                                       | 1323               | 889                 | 0                             | 66                         | 0                               | 26                           |
| NB06 | Irving (Paper): Saint John, NB               | 11925                                       | 3392               | 670                 | 5                             | 52                         | 0                               | 16                           |
| NB07 | Irving (Pulp and Paper): Saint John, NB      | 41143                                       | 2725               | 2148                | 1                             | 157                        | 2                               | 42                           |
| NB08 | Irving: Lake Utopia, NB                      | 6125  | 424                | 321                 | 1                             | 52                         | 3                               | 19                           |
| NB09 | AV Group: Nackawic, NB                       | 21936                                       | 560                | 426                 | 0                             | 53                         | 0                               | 12                           |
| NF03 | Kruger: Corner Brook, NF                     | 21080                                       | 380                | 123                 | 2                             | 106                        | 0                               | 26                           |
| NS01 | Maibec: East River, NS                       | 415   | 66                 | 17                  | 0                             | 53                         | 0                               | 14                           |
| NS03 | CKF Incorporated: Hansport, NS               | 1811  | 11                 | 39                  | 0                             | 52                         | 0                               | 12                           |
| NS04 | Paper Excellence: Northern Pulp, NS          | 4099  | 71                 | 88                  | 4                             | 27                         | 4                               | 12                           |
| NS06 | Port Hawkesbury Paper: Port Hawkesbury, NS   | 7347  | 356                | 68                  | 0                             | 53                         | 0                               | 12                           |
| ON05 | Domtar: Dryden, ON                           | 35673                                       | 844                | 780                 | 0                             | 52                         | 0                               | 12                           |
| ON06 | Resolute Forest Products: Thunder Bay, ON    | 46269                                       | 1402               | 607                 | 1                             | 153                        | 0                               | 36                           |
| ON07 | Resolute Forest Products: Thorold, ON        | 3979  | 8                  | 1                   | 0                             | 52                         | 0                               | 12                           |
| ON11 | Cascades: Trenton, ON                        | 1352  | 5                  | 4                   | 0                             | 52                         | 0                               | 12                           |
| ON12 | Domtar: Espanola, ON                         | 37611                                       | 1354               | 808                 | 0                             | 54                         | 0                               | 14                           |
| ON15 | Dunn Paper: St. Catharines, ON               | 2838  | 17                 | 53                  | 0                             | 52                         | 0                               | 12                           |
| ON17 | AV Group: Terrace Bay, ON                    | 37096                                       | 1396               | 833                 | 0                             | 52                         | 0                               | 12                           |
| ON21 | Rayonier: Kapuskasing, ON                    | 12519                                       | 115                | 46                  | 0                             | 52                         | 0                               | 12                           |
| ON23 | Sonoco: Trent Valley, ON                     | 278   | 4                  | 2                   | 1                             | 24                         | 0                               | 6                            |
| ON24 | Strathcona Paper: Napanee, ON                | 512   | 6                  | 8                   | 0                             | 52                         | 0                               | 12                           |
| PY01 | Catalyst: Crofton, BC                        | 54832                                       | 1125               | 355                 | 1                             | 58                         | 0                               | 18                           |
| PY02 | Paper Excellence: Howe Sound, BC             | 24275                                       | 370                | 138                 | 1                             | 71                         | 2                               | 32                           |

| ID   | MILL NAME                                  | ANNUAL EFFLUENT FLOW (1000 m <sup>3</sup> ) | ANNUAL SS (tonnes) | ANNUAL BOD (tonnes) | ANNUAL DAPHNIA MAGNA FAILURES | ANNUAL DAPHNIA MAGNA TESTS | ANNUAL ACUTE LETHALITY FAILURES | ANNUAL ACUTE LETHALITY TESTS |
|------|--|---|--------------------|---------------------|-------------------------------|----------------------------|---------------------------------|------------------------------|
| PY05 | Catalyst: Port Alberni, BC                 | 22372                                       | 417                | 166                 | 0                             | 50                         | 0                               | 12                           |
| PY07 | Catalyst: Powell River, BC                 | 39066                                       | 186                | 87                  | 1                             | 103                        | 0                               | 63                           |
| PY12 | Paper Excellence: Mackenzie, BC            | 12255                                       | 838                | 277                 | 0                             | 45                         | 0                               | 12                           |
| PY13 | Cariboo Pulp and Paper: Quesnel, BC        | 32454                                       | 1341               | 834                 | 0                             | 52                         | 0                               | 12                           |
| PY14 | Paper Excellence: Skookumchuck, BC         | 13018                                       | 534                | 335                 | 0                             | 52                         | 0                               | 12                           |
| PY17 | Canfor - Northwood Pulp: Prince George, BC | 40986                                       | 2561               | 1273                | 0                             | 53                         | 0                               | 12                           |
| PY18 | Mercer Celgar: Castlegar, BC               | 51425                                       | 719                | 173                 | 0                             | 52                         | 0                               | 12                           |
| PY19 | Canfor - PGI: Prince George, BC            | 43144                                       | 3137               | 1161                | 0                             | 53                         | 0                               | 12                           |
| PY20 | Quesnel River Pulp: Quesnel, BC            | 7496  | 2268               | 464                 | 1                             | 53                         | 9                               | 26                           |
| PY21 | Kruger: New Westminster, BC                | 2845  | 117                | 68                  | 0                             | 54                         | 0                               | 12                           |
| PY22 | Domtar: Kamloops, BC                       | 34191                                       | 858                | 870                 | 0                             | 52                         | 0                               | 12                           |
| PY25 | Canfor: Taylor, BC                         | 5606  | 463                | 375                 | 0                             | 53                         | 0                               | 14                           |
| PY26 | Nanaimo Forest Products: Harmac, BC        | 49607                                       | 2105               | 367                 | 0                             | 52                         | 0                               | 14                           |

## APPENDIX C: EFFECT DESIGNATIONS AND SLT VALUES FOR CANADIAN MILLS IN OPERATION

| ID   | COMPANY: MILL NAME                                    | GEOMETRIC MEAN IC <sub>25</sub><br>SUBLETHAL TOXICITY <sup>7</sup><br>(2010 TO 2020) |              | MILL EFFECTS DESIGNATION ( <i>Most Recent Study Conducted</i> ) |              |                      |             |
|------|---|--|--------------|---|--------------|----------------------|-------------|
|      |   | Algae  | Invertebrate | Overall   | Fish Habitat | Fish Population      | Fish Tissue |
| QC01 | Sappi: Matane, QC                                     | 3.04   | 7.40         | effect  | no effect    | effect               | no effect   |
| QC02 | Papiers White Birch - F.F. Soucy: Rivière-du-Loup, QC | 33.48  | 24.28        | effect  | effect       | effect               | no effect   |
| QC03 | Cascades: Cabano, QC                                  | 100.00   | 59.46        | effect  | effect       | effect               | no effect   |
| QC04 | Resolute Forest Products: Alma, QC                    | 12.36  | 13.97        | effect  | effect       | effect               | no effect   |
| QC05 | Resolute Forest Products: Kénogami, QC                | 86.04  | 21.65        | effect  | effect       | no effect            | no effect   |
| QC06 | FibreK : Saint-Félicien, QC                           | 51.30  | 25.60        | effect  | effect       | effect               | no effect   |
| QC07 | Resolute Forest Products: Dolbeau, QC                 | 100.00   | 82.08        | monitoring not required   |              |                      | no effect   |
| QC08 | BP Canada: Pont Rouge, QC                             | 75.15  | 88.95        | monitoring not required   |              |                      | no effect   |
| QC09 | MPI Moulin: Portneuf, QC                              | 60.71  | 24.50        | effect  | effect       | effect               | no effect   |
| QC10 | Papiers White Birch: Stadacona, QC                    | 48.91  | 67.78        | monitoring not required   |              |                      | no effect   |
| QC11 | Resolute Forest Products: Clermont, QC                | 100.00   | 76.49        | effect  | effect       | effect               | no effect   |
| QC12 | Cascades: Kingsey Falls, QC                           | 58.71  | 56.33        | effect  | effect       | effect               | no effect   |
| QC14 | Westrock: La Tuque, QC                                | 90.28  | 72.24        | effect  | effect       | effect               | no effect   |
| QC15 | Kruger - Wayagamack: Trois-Rivières, QC               | 57.70  | 67.36        | monitoring not required   |              |                      | no effect   |
| QC16 | Kruger: Trois-Rivières, QC                            | 77.64  | 79.18        | monitoring not required   |              |                      | no effect   |
| QC17 | Domtar: Windsor, QC                                   | 92.71  | 56.49        | effect  | effect       | effect               | no effect   |
| QC18 | Kruger: Brompton, QC                                  | 84.05  | 70.24        | effect  | effect       | effect               | no effect   |
| QC19 | Kruger: Sherbrooke, QC                                | 73.55  | 9.66         | effect  | effect       | studies inconclusive | no effect   |
| QC20 | Resolute Forest Products: Gatineau, QC                | 97.22  | 67.07        | effect  | effect       | effect               | no effect   |
| QC21 | Papiers White Birch - Papiers Masson: Gatineau, QC    | 94.18  | 51.95        | effect  | effect       | effect               | no effect   |
| QC22 | Fortress Specialty Cellulose: Thurso, QC              | 62.11  | 73.42        | effect  | effect       | effect               | no effect   |

<sup>7</sup> This value represents the effluent concentration that causes a 25% reduction in growth or reproduction in test organisms, known as the *inhibiting concentration (IC<sub>25</sub>)*. If a 100% concentration of effluent causes less than a 25% inhibition, the effluent is reported as showing no sublethal toxicity for that test.

| ID   | COMPANY: MILL NAME                           | GEOMETRIC MEAN IC <sub>25</sub><br>SUBLETHAL TOXICITY <sup>7</sup><br>(2010 TO 2020) |              | MILL EFFECTS DESIGNATION ( <i>Most Recent Study Conducted</i> ) |                      |                         |             |
|------|--|--|--------------|---|----------------------|-------------------------|-------------|
|      |  | Algae  | Invertebrate | Overall   | Fish Habitat         | Fish Population         | Fish Tissue |
| QC23 | Kruger: Gatineau, QC                         | 89.04  | 19.93        | monitoring not required   |                      |                         | no effect   |
| QC24 | Resolute Forest Products: Amos, QC           | 84.76  | 51.64        | effect  | effect               | effect                  | no effect   |
| QC25 | Rayonier: Témiscaming, QC                    | 87.81  | 36.49        | effect  | effect               | effect                  | no effect   |
| QC26 | Resolute Forest Products: Baie-Comeau, QC    | 20.79  | 56.08        | effect  | effect               | effect                  | no effect   |
| QC27 | Nordic Kraft: Lebel-sur-Quévillon, QC        | not operational  |              |   |                      |                         |             |
| QC28 | Sustana Fiber: Breakyville, QC               | 44.67  | 25.48        | effect  | effect               | effect                  | no effect   |
| QC29 | Kruger: Crabtree, QC                         | 95.32  | 73.37        | effect  | effect               | effect                  | no effect   |
| QC30 | Cascades: Lachute, QC                        | 71.43  | 22.31        | effect  | effect               | monitoring not required | no effect   |
| QC31 | Enterprises Rolland: St. Jerome, QC          | 66.24  | 10.51        | effect  | effect               | effect                  | no effect   |
| AB01 | Alberta Newsprint: Whitecourt, AB            | 63.45  | 31.53        | effect  | effect               | monitoring not required | no effect   |
| AB02 | Alberta Pacific Forest Industries: Boyle, AB | 96.57  | 46.15        | effect  | effect               | effect                  | no effect   |
| AB03 | Mercer Celgar: Peace River, AB               | 81.41  | 37.52        | monitoring not required   |                      |                         | no effect   |
| AB05 | Millar Western: Whitecourt, AB               | 22.18  | 13.97        | effect  | effect               | monitoring not required | no effect   |
| AB06 | West Fraser: Slave Lake, AB                  | 18.64  | 17.84        | no effect   | no effect            | monitoring not required | no effect   |
| AB07 | International Paper: Grande Prairie, AB      | 90.38  | 28.31        | effect  | effect               | effect                  | no effect   |
| AB08 | West Fraser: Hinton, AB                      | 92.34  | 29.40        | effect  | no effect            | effect                  | no effect   |
| MB02 | Canadian Kraft Paper Industries: The Pas, MB | 100.00   | 34.06        | effect  | effect               | effect                  | no effect   |
| NB01 | AV Group: Atholville, NB                     | 0.86   | 1.41         | effect  | effect               | studies inconclusive    | no effect   |
| NB03 | Twin Rivers Paper: Edmunston, NB             | 45.49  | 16.13        | effect  | effect               | effect                  | no effect   |
| NB06 | Irving (Paper): Saint John, NB               | 13.94  | 73.04        | effect  | effect               | studies inconclusive    | no effect   |
| NB07 | Irving (Pulp and Paper): Saint John, NB      | 4.76   | 6.85         | effect  | studies inconclusive | studies inconclusive    | no effect   |
| NB08 | Irving: Lake Utopia, NB                      | 0.71   | 1.48         | effect  | studies inconclusive | effect                  | no effect   |
| NB09 | AV Group: Nackawic, NB                       | 86.51  | 28.05        | effect  | effect               | effect                  | no effect   |
| NF03 | Kruger: Corner Brook, NF                     | 21.02  | 14.29        | effect  | effect               | effect                  | no effect   |
| NS01 | Maibec: East River, NS                       | 3.99   | 3.43         | monitoring not required   |                      |                         | no effect   |
| NS03 | CKF Incorporated: Hansport, NS               | 17.39  | 57.21        | monitoring not required   |                      |                         | no effect   |
| NS04 | Paper Excellence: Northern Pulp, NS          | 0.94   | 3.78         | effect  | effect               | effect                  | no effect   |
| NS06 | Port Hawkesbury Paper: Port Hawkesbury, NS   | 7.64   | 30.38        | effect  | effect               | effect                  | no effect   |

| ID   | COMPANY: MILL NAME                         | GEOMETRIC MEAN IC <sub>25</sub><br>SUBLETHAL TOXICITY <sup>7</sup><br>(2010 TO 2020) |              | MILL EFFECTS DESIGNATION ( <i>Most Recent Study Conducted</i> ) |              |                         |             |
|------|--|--|--------------|---|--------------|-------------------------|-------------|
|      |  | Algae  | Invertebrate | Overall   | Fish Habitat | Fish Population         | Fish Tissue |
| ON05 | Domtar: Dryden, ON                         | 82.78  | 30.25        | effect  | effect       | effect                  | no effect   |
| ON06 | Resolute Forest Products: Thunder Bay, ON  | 54.65  | 55.48        | effect  | effect       | effect                  | no effect   |
| ON07 | Resolute Forest Products: Thorold, ON      | not operational  |              |   |              |                         |             |
| ON11 | Cascades: Trenton, ON                      | monitoring not required  |              |   |              |                         | no effect   |
| ON12 | Domtar: Espanola, ON                       | 97.65  | 59.61        | effect  | effect       | effect                  | no effect   |
| ON15 | Dunn Paper: St. Catharines, ON             | 88.85  | 30.42        | effect  | effect       | effect                  | no effect   |
| ON17 | AV Group: Terrace Bay, ON                  | 58.09  | 25.76        | effect  | effect       | effect                  | no effect   |
| ON21 | Rayonier: Kapuskasing, ON                  | 78.92  | 54.21        | effect  | effect       | effect                  | no effect   |
| ON23 | Sonoco: Trent Valley, ON                   | 77.02  | 30.03        | monitoring not required   |              |                         | no effect   |
| ON24 | Strathcona Paper: Napanee, ON              | 100.00   | 68.89        | effect  | effect       | effect                  | no effect   |
| PY01 | Catalyst: Crofton, BC                      | 7.78   | 15.18        | effect  | effect       | effect                  | no effect   |
| PY02 | Paper Excellence: Howe Sound, BC           | 6.46   | 14.56        | effect  | effect       | no effect               | no effect   |
| PY05 | Catalyst: Port Alberni, BC                 | 5.31   | 26.18        | effect  | effect       | no effect               | no effect   |
| PY07 | Catalyst: Powell River, BC                 | 15.02  | 45.73        | effect  | effect       | no effect               | no effect   |
| PY12 | Paper Excellence: Mackenzie, BC            | 82.25  | 38.10        | effect  | effect       | no effect               | no effect   |
| PY13 | Cariboo Pulp and Paper: Quesnel, BC        | 100.00   | 53.69        | effect  | no effect    | effect                  | no effect   |
| PY14 | Paper Excellence: Skookumchuck, BC         | 79.42  | 26.97        | effect  | effect       | effect                  | no effect   |
| PY17 | Canfor - Northwood Pulp: Prince George, BC | 94.14  | 44.62        | effect  | no effect    | effect                  | no effect   |
| PY18 | Mercer Celgar: Castlegar, BC               | 98.11  | 74.03        | no effect   | no effect    | no effect               | no effect   |
| PY19 | Canfor - PGI: Prince George, BC            | 98.60  | 59.10        | effect  | no effect    | effect                  | no effect   |
| PY20 | Quesnel River Pulp: Quesnel, BC            | 2.31   | 27.87        | monitoring not required   |              |                         | no effect   |
| PY21 | Kruger: New Westminster, BC                | 93.50  | 61.43        | monitoring not required   |              |                         | no effect   |
| PY22 | Domtar: Kamloops, BC                       | 98.76  | 72.47        | effect  | effect       | effect                  | no effect   |
| PY25 | Canfor: Taylor, BC                         | 48.48  | 41.34        | monitoring not required   |              |                         | no effect   |
| PY26 | Nanaimo Forest Products: Harmac, BC        | 2.47   | 6.98         | effect  | effect       | monitoring not required | no effect   |



## LIST OF ACRONYMS AND ABBREVIATIONS

|             |  |
|-------------|--|
| <b>BOD</b>  | biochemical oxygen demand                  |
| <b>EEM</b>  | environmental effects monitoring           |
| <b>kT</b>   | kilo tonnes                                |
| <b>PPER</b> | <i>Pulp and Paper Effluent Regulations</i> |
| <b>SS</b>   | suspended solids                           |