EXECUTIVE SUMMARY

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MONITORING LAKE GENEVA

The physicochemical analyses of the lake water, including micropollutants, as well as the biological monitoring, are achieved at the lake's deepest point, designated SHL2.

1. PHYSICOCHEMICAL QUALITY AT SHL2

Like the year before, 2018 was hot, with the air temperature more than 1.5°C above the interannual mean in the historical reference (1981–2010). The lake water continued to heat, varying by +0.1°C at the bottom. At the surface the summer maximum (26.1°C on 22 August) also surpassed the previous years' maximum levels (24.5°C in 2017 and 22.2°C in 2016). Resulting from a mild winter, mixing was once again incomplete, reaching only 201 m deep at the beginning of March, insufficient to re-oxygenate the bottom waters. The dissolved oxygen content at the bottom remained at < 4 mg L^{-1} throughout the year, which is detrimental to maintaining benthic organisms and can induce the release of phosphorus and manganese stored in sediments. Thermal stratification was in place by the beginning of April; destratification occurred only in mid-November, later than in previous years.

Among the nutrients, the different forms of phosphorus evolved in a contrasted and sometimes substantial fashion over the year. The mean concentrations of soluble reactive phosphorus (or bioavailable phosphorus) were measured at 4.62 µg L^{-1} in the surface layer (0–30 m) and 39.0 µg L^{-1} at the bottom (250–309 m), marking an increase at the surface (+0.80 µg L^{-1}) and a decrease at the bottom (−1.77 µg L^{-1}). Particulate phosphorus, which here is mainly the form fixed by phytoplankton, reached high values during the spring and summer, related to the growth of phytoplankton (see below).

The weighted mean annual concentration of total phosphorus was 19.9 µg L^{-1} in 2018, an increase greater than 2 µg L^{-1} compared to 2017, while the weighted mean in orthophosphate equalled 14.5 µg L^{-1} in 2018, near the valued estimated in 2017 (14.8 µg L^{-1}). This suggests that the increase in the mean total phosphorus concentration stems for the most part from the particulate forms of this element.

Several phenomena may explain this rise in total phosphorus, notably (i) growth of phytoplankton combined with less summer predation from zooplankton, resulting in an increase in particulate phosphorus, and (ii) phosphorus coming from the lake's tributaries, notably the Rhône, whose flow rate was high in 2018. This increase in flow rate can be explained by abundant winter rain and glacier melting due to high summer temperatures. These two hypothetical causes of the increase in phosphorus are not mutually exclusive.

After a continuous increase in the mean concentration of chloride from 1973 to 2016, it has stabilised at 10.3 mg L^{-1}, a stock of approximately 892 000 t in the lake. This stabilisation, in all likelihood related to mild winters and therefore less road salting, must be confirmed over the coming years.

2. PHOSPHORUS, NITROGEN AND CHLORIDE INFLOWS AND OUTFLOWS

The CIPEL's monitoring programme includes the estimation of nutrient and chloride flow entering the lake by its main tributaries (the Rhône, Dranse, Venoge, Aubonne, Versoix), and its flows exported from the catchment by the outflowing Rhône, Arve and Allondon.

The flows recorded in 2018 seem similar to the preceding years for the Aubonne, Venoge and Versoix, and substantially higher in the Rhône upstream of the lake (+30 m^3 s^{-1} compared to 2016, +60 m^3 s^{-1} compared to 2017).

The phosphorus flow incudes two main components: a particle fraction (for the most part mineral, or apatitic, non-assimilable) and a dissolved fraction (orthophosphate). The total phosphorus flow into the lake from tributaries in 2018 was estimated at 927 t $year^{-1}$, a value which had no longer been observed for 13 years. Particulate phosphorus accounts for the majority of this flow, with orthophosphate estimated at less than 30 t $year^{-1}$. The orthophosphate flow is not influenced by flow variations, but more by wastewater treatment plant effluents (see section 3 of the second part of the summary).

Even though the flows at the lake's outlet are on the same order of magnitude as the accumulated flows of the tributaries, the total phosphorus flow exported downstream of Lake Geneva is lower (225 t $year^{-1}$) than the inflowing flow because of the sedimentation of particulate phosphorus in the lake.

The total nitrogen inflow, which was relatively stable (around 4700 t $year^{-1}$ over the past 20 years), was higher in 2018 (5882 t $year^{-1}$), mainly because of increased flow from the Rhône. Also higher than the previous years, the outflow is estimated at 5807 t $year^{-1}$).

The chloride inflow to the lake (slightly more than 69 000 t $year^{-1}$) does not correlate well with flow, related to the main source of this flow, road salting. The flux/flow relation is therefore better for lowland rivers flowing into the lake, which are more heavily influenced by runoff water loaded in salt from snow removal than the Rhône, fed in part by snowmelt, even though it accounts for the largest proportion of flow entering the lake.

3. BIOLOGICAL MONITORING OF THE PELAGIC ZONE (SHL2)

As for phytoplankton, at the beginning of the year (end of January to end of March) we noted the presence of benthic taxa in the water column at the centre of the lake (*Diatoma elongatum* and to a lesser extent *Ulnaria acus*), which could be explained by winter rains having drained the benthic compartment. Then, once the thermal stratification was in place, the filamentous algae *Mougeotia gracillima*, which develops at a depth of 15–20 m, dominated the phytoplanktonic compartment during the period from spring to summer. The observation of several chlorophyte species, indicative of eutrophic environments, is also notable during this period. At the end of summer, *M. gracillima* was replaced by another filamentous alga, *Planktothrix rubescens*, which is a cyanobacterium that can release toxins. However, its biomass remained lower than health warning thresholds. It was maintained until the end of the year, with other *Diatoma* species that are indicative of shallow environments. The mean annual biomass in 2018 (1582 µg L^{-1}) was close to the biomass in 2017 and remained high compared to the historical reference since 1974. Phytoplankton's diversity index (Shannon Index) has been relatively stable since 1974; nevertheless, the previous years, the highest diversity values were for recent years, notably 2015, 2016, 2017 and 2018, while the lowest indices were observed for the years with *M. gracillima* blooms. The Brettum Index, which expresses the lakes ecological state, remained mediocre for 2018.

The maximum picocyanobacterium concentrations were observed from mid-July to the end of August, as well as in mid-October. They accounted for a mean 6.1% of the phytoplankton biomass, a lower value than in 2016 and 2017, but comparable to 2014–2015; the proportion of the biomass represented by picocyanobacteria varied over the year: it reached 21% in August and 31% in October. The development of this picocyanobacterial compartment appears to be more strongly influenced by water temperature and depth (actually, light, which is negatively correlated with depth) and then by nutrients. On the other hand, the distribution of picocyanobacteria was negatively correlated with orthophosphates (weakly) and nitrate ions (more strongly). Picocyanobacteria therefore comprise a good indicator of the trophic condition of the ecosystem and its response to rising water temperatures.

The mean and maximum chlorophyl-*a* concentrations measured in the first 30 m present showed synchronous change, characterised by low values at the beginning of the year, when the lake had not yet stratified, then a rapid increase beginning in April when stratification was occurring. In the first layer of water from 0 to 30 m, the mean chlorophyl concentration reached its maximum (9.3 µg L^{-1}) in mid-June; high chlorophyl-*a* concentrations were maintained until the end of September and then decreased because of the decrease in light and temperature.

Throughout the year, the crustacean community was largely dominated by copepods (canids and cyclopids), much more abundant than cladocerans in the spring and end of summer. The first peak of abundance occurred in March, the second (cyclopids) in October. Cladocerans (Bosminidae) also increased in the spring, were not abundant in summer and showed a second peak in October.

The abundance of cladocerans (daphnids, Bosminidae, *Bythotrephes longimanus*), taxa that are important for feeding whitefish, was marked by an interannual decreasing trend, possibly explained by the decrease in the abundance of certain algae and the predatory pressure from whitefish.

Whitefish fed mainly on cladocerans (in 2018: 61% *Bythotrephes longimanus*, 23.5% daphnids, 9.2% *Leptodora*) except in October when they also fed on the larvae of chironomids (61%). On the other hand, very few copepods were found in their stomach contents, although they were more abundant. In terms of the interannual trends, the contribution of *B. longimanus* increased in spring, at the expense of the number of daphnids. The contribution of daphnids to the food bowl of whitefish was one of the lowest observed since 2006, and since 2012 this decrease has been correlated with the drop in the abundance of this prey in the environment.

4. SURVEILLANCE OF WHITEFISH AND PERCH SPAWNING

Whitefish (like char) spawn at the end of autumn and the beginning of winter when temperatures drop below a threshold value (approximately 7–8°C). In contrast, perch spawn in spring, when the water temperature rises above 10°C. With climate change, these threshold values could be reached earlier for perch and later for whitefish.

The whitefish reproduction period began at the beginning of December 2017; in roughly 10 days, 50% of the genitors were collected. The spawning peak should be close to these two dates. The maximum numbers of reproducers captured was reached slightly before the end of the month. The captures were for the most part males (78%). The mean size was 440 ± 42.7 mm and the mean age was 2.4 years. The mean numbers captured in 2017–2018 were lower than in 2016–2017, probably related to the decrease in the whitefish stock. The 2017–2018 reproduction season was the earliest since the beginning of the monitoring programme, which is explained by lower temperatures at the end of the year.

Perch spawning began at the end of April 2018 (the 29th), slightly earlier than in 2017 (2 May). The peak of spawning activity was observed on 11 May, here also a few days earlier than in 2017 (15 May 2017), with a temperature close to 11°C 8 m deep. A retrospective analysis of all the data from monitoring perch reproduction phenology will make it possible to determine whether a more significant discrepancy in spawning is observed in relation with the rise in water temperatures in spring in Lake Geneva.

5. MICROPOLLUTANTS IN THE RHÔNE RIVER WATERS

One hundred eighteen chemical products, including a new fungicide, fenpyrazamine, frequently used in viticulture since 2015, 33 pharmaceutical active substances, two anti-corrosion agents, a solvent (1,4-dioxane) and methyltertbutylether (MTBE, an additive for fuel) were investigated in the Rhône waters at Porte du Scex, with a mean of 27 samples over 14 days (three samplings per hour).

Nineteen chemical substances were detected. None of them had reached (or surpassed) the threshold concentration of 0.1 µg L^{-1} (water protection ordinance, and European drinking water norm) or the ecological effects criteria (environmental quality norm) proposed by the Ecotox Centre; nor did the total concentration (sum of the concentrations of all the pesticides) exceed 0.5 µg L^{-1}. During the 2008–2018 period, the maximum concentrations decreased for most chemical substances. The total quantity of chemical products having transited the lake by the Rhône was estimated at 308 kg in 2018 versus 444 kg in 2017, 577 kg in 2016 and 277 kg in 2015. The greatest proportion of this load (e.g. 293 kg in 2018) stemmed from agricultural uses. Industrial discharges remained limited (15 kg $year^{-1}$ in 2018, 11 kg $year^{-1}$ in 2017), and for the most part involve chemical products that are infrequently used in the region (e.g. foramsulfuron). A reduction in agricultural fluxes was also observed, which must be viewed in light of the dry weather during spring and summer in the Valais in 2018.

Of the 65 pharmaceutical active substances explored, 15 were detected, most of which showed mean concentrations lower than 0.01 µg L^{-1}. Metformin (an anti-diabetic drug) presented the highest mean and maximum concentrations (0.49 and 1.15 µg L^{-1}, respectively), with a winter peak probably related to the increase of the population in winter sports resorts. Methenamine (urinary tract antibiotic) also reached a maximum slightly higher than 1 µg L^{-1}. The other medications presenting notable concentrations (ribavirin, an antiviral; prilocaine, a local anesthetic; carbamazepine, an anti-epileptic) reach a maximum of 0.16–0.29 µg L^{-1}.

The total annual load of pharmaceutical compounds reached 3000 kg in 2018, with metformin alone accounting for 2354 kg $year^{-1}$, increasing by 500 kg compared to 2017. The annual load of methenamine is estimated at 407 kg, versus 381 kg in 2017; in both cases these flows are much higher than the flows estimated based on industrial self-monitoring.

Two anti-corrosion compounds (benzotriazole and tolyl-triazole) were also observed throughout the year: mean, 0.04 and 0.02 µg L^{-1}, respectively. The concentrations of 1,4-dioxane have decreased significantly since 2014: the load estimated in 2018 is only 345 kg, compared to 750 kg for 2015 and 6 t in 2014. MTBE was detected episodically (mean concentration, 0.03 µg L^{-1}).

6. CHANGES IN METAL AND MICROPOLLUTANT CONCENTRATIONS IN THE CENTRE OF THE LAKE (SHL2)

The contents of trace metal elements and pesticides are assessed twice a year at four depths, in spring (after mixing of the water) and in autumn (during the stratification period). Medication residues are analysed three times a year (winter, beginning of summer and autumn) at two depths.

The contents of dissolved metals measured in the surface layer remained low and respect the Swiss and French reference values for drinkable water. The increases in manganese concentrations in September to 305 and 309 m compared to March show that the lake is anoxic at the end of summer and demonstrates release of this element by sediments. The manganese concentration at 309 m was higher in 2017–2018 than during the 2014–2016 period.

Few pesticides were detected (38 substances out of a total of 379 sought): for the most part these were herbicides (23 substances) and their metabolites (eight substances), more rarely fungicides (five substances). The levels measured remained low (sum of the concentrations varying between 0.054 and 0.123 µg L^{-1}) and respect the Swiss and French reference values for drinkable water, individually and totaled. In 2018, only three substances were observed at concentrations greater than or equal to 0.010 µg L^{-1}: atrazine (herbicide), metalaxyl (fungicide) and aminomethylphosphonic acid (AMPA, a degradation product of the herbicide glyphosate). The AMPA concentration at 30 m has been increasing since its introduction in the monitoring programme in 2015 and reached 0.023 µg L^{-1} in March 2018. For other products such as atrazine (banned for the past 10 years) or metalaxyl (its source presumably industrial) the concentrations appeared stable.

As for pharmaceutical compounds, we first found metformin at similar concentrations to those observed in 2017 (0.4–0.6 µg L^{-1}), and its metabolite guanylurea at 0.11 µg L^{-1}. The other most frequently found compounds (carbamazepine; carisoprodol, a pain-killer; mepivacaine, a local anesthetic; and methenamine) were measured at lower concentrations, less than 0.1 µg L^{-1}. Except for methenamine, monitored since 2017, the third compound in descending order after metformin and guanylurea, the concentrations of these medication residues are stable or decreasing.

SPECIFIC STUDIES

1. MICROPOLLUTANTS IN FISH

This study examined the mercury contamination of roach and burbot and an extensive range of synthetic organic compounds, notably polychlorobiphenyls (PCBs), polybrominated diphenyl ethers (PBDEs), hexabromocyclododecane (HBCDD), chlorinated paraffins (C10–C13), perfluorooctane sulfonate (PFOS), and a variety of alternative flame retardants with PBDEs and HBCDD.

Lake Geneva appears to have little contamination by PBDEs, HBCDD, chlorinated paraffins, PCBs (except dioxin-like PCBs, PCB-DL), and most of the chlorinated and bromine flame retardants that are alternatives to PBDEs. However, the mean concentrations surpassed evaluation criteria (toxicity for predators) for mercury and PCB-DL. For PFOS, the mean concentrations were lower than the evaluation criteria, but a few individual compounds went beyond threshold levels. An alternative flame retardant, decabromodiphenyl-ethane (DBDPE), was also detected systematically.

Mercury and PCB concentrations, which have been monitored for many years, have decreased significantly over the decades and seem to have stabilised. Today it is premature to adjudicate on the trends followed by PBDEs and PFOS.

2. HYDROPHOBIC MICROPOLLUTANTS IN TRIBUTARIES

This study completes the monitoring of micropollutants in the Rhône, providing a partial vision of the micropollutants found in the lake. The CIPEL's surveillance mission includes identifying sources of several groups of contaminants as well as the associated flows, based on the main tributaries. This study first investigated passive sampling devices (PSDs), integrator devices that can increase the volume of water analysed and thus reduce the quantification limits. The set-up was completed by analyses on suspended matter (SM), but in smaller numbers.

Silicone PSDs (PDMS) were implanted at 46 sites selected in the surveillance network and completed by a few potentially impacted sites, for 6 weeks in September–October 2018. Three classes of hydrophobic compounds (PCB, PBDE, HAP) were analysed in the PDMSs as well as SMs collected with eight sediment traps. The few SM analyses corroborate the PSD results.

For PCBs, waterbodies presenting the highest concentrations are the Nant d'Avril (near Geneva), the Chamberonne and the Venoge on the north bank (towards Lausanne), and the Arve (at Passy), and to a lesser extent the Vengeron, the Eau Froide de Roche and the Rhône (particularly at Evionnaz, upstream of the Porte du Scex station). A high number of industries (notably in the Arve valley) and contaminated waste disposal/embankment sites (notably the upstream Rhône) are present near these sites and make up potential sources of PCBs. Other current sources such as the discharges of pumped-storage hydroelectricity (PSH) (the Venoge), or historical sources such as high-power electrical installations (the Nant d'Avril) can also be cited. Compared to a previous campaign (EPFL, 2016), decreases in the concentrations were noted for the Dranse and the Aubonne, to be confirmed because they were possibly influenced by precipitations, and around the Stockalper canal, where large sewage works have taken place since that time.

Among the PBDEs analysed, two main congeners (47 and 99) stand out, with the others frequently (100) or systematically (28, 153 and 154) lower than the quantification limits. The sites presenting higher concentrations are located on the Chamberonne, the Eau Froide de Roche and the Venoge, manifesting emissions related to urbanisation, as for (in part) PCBs.

The highest PAH contents and loads were demonstrated in the Arve (most particularly at Passy) and the Rhône. For three classes of contaminants, the highest estimated loads come from the Rhône and the Arve, with differences in behaviour, however: a reduction between the source upstream and downstream for PAHs in the Arve, suggesting retention in the river (e.g. sediments), increasing from upstream to downstream for PCBs in the Rhône and PBDEs in the Rhône and the Arve, suggesting an accumulation of more or less diffuse sources.

This study makes available a more extensive and more precise diagnosis of the input sources of these three classes of contaminants to Lake Geneva. This diagnosis will be completed by a new campaign at a different period and the addition of passive sensors that will detect less hydrophobic contaminants. Periodic monitoring of the most notable sites should also be planned.

3. NON-POINT SOURCE PHOSPHORUS INPUTS TO LAKE GENEVA

A retrospective overview of the non-point source phosphorus inputs from tributaries was carried out in 2018. After the prospective on the domestic phosphorus inputs published in 2018, this report comprises the first part of the second step of a prospective procedure examining the coming 50 years according to different scenarios.

The retrospective overview (2001–2017) consisted in estimating the phosphorus fluxes from the lake's main tributaries (the upstream Rhône, Dranse, Aubonne, Venoge and Versoix) and then subtracting the accumulated flows coming from wastewater treatment plants.

For this period, the upstream Rhône accounted for a mean 87% of the water inputs to Lake Geneva, with a regime influenced by snowmelt and glacier melt. The total flow of phosphorus from tributaries varied between 1468 t year^{-1} (maximum, observed in 2004) and 371 t year^{-1} (minimum, observed in 2014), whereas this flow from PSH varied between 73 t year^{-1} (maximum, observed in 2017) and 35.5 t year^{-1} (minimum, observed in 2015). The upstream Rhône accounted for a mean 92% of the total phosphorus inputs, but only 76% of the orthophosphate input (30–100 t year^{-1}, with 4.7–13 t year^{-1} coming from PSH).

Total phosphorus flow, in the Rhône and the other tributaries, correlated well with pluviometry, notably during the summer, indicating that the soil erosion process dominated in these fluxes. As a result, it can be concluded that the non-point sources indeed dominated these phosphorus fluxes, from 80 to 90% for the Rhône and less for the other tributaries. Non-point sources also dominated for orthophosphate, but to a lesser degree, especially since PSH inputs for this parameter were probably underestimated.

The next step in this prospective approach will consist in estimating non-point source phosphorus flows over the next 50 years according to several climate change and land use scenarios.

4. TEMPERATURE STUDY IN THE COASTAL ZONE

The reflexions of a working group on the effects of climate change on Lake Geneva's ecosystem have raised the question of setting up temperature monitoring in the coastal zone. To respond to this question, a bibliographical study was conducted, completed by statistical analysis of the existing data (the Buchillon station (VD) in Switzerland and the INRA station at Thonon-les-Bains on the French side). Water temperature variations on these two coastal sites were compared to the temperature measurements taken at the lake's centre (point SHL2).

This bibliographical study showed that summer temperatures in the coastal zone are increasing at the same speed as the mean lake temperatures in summer, without ignoring the seasonal variations or the effects of meteorological factures such as wind. Lake size also plays a considerable role in the heterogeneity of surface temperatures, with Lake Geneva appearing as a modestly sized lake compared to other large lakes, most particularly in North America, which have been the subject of a number of important studies. The temperatures measured at Buchillon turned out to be strongly correlated with those measured using remote sensing (during the night), which made it possible to map surface temperatures.

The statistical analysis of the temperatures measured at Buchillon, Thonon-les-Bains and SHL2 showed lower mean temperatures at the centre of the lake (−0.84°C) than in the coastal zone, with the difference tending to decrease as depth increases. The warming speed in spring and the cooling speed in autumn were also slightly faster at the coastal stations. From 1992 to 2016, the surface temperatures measured at the SHL2 site showed a warming trend equivalent to that measured at the Thonon-les-Bains site.

Even if differences exist at the surface (attenuated or even inexistent at 1 m deep), the daily temperatures at the coastal sites and the centre of the lake are strongly correlated. The same is true of the monthly averages, with weaker correlation coefficients for certain months such as April, when the temperature changes the most rapidly. It therefore does not seem necessary to increase the number of coastal temperature monitoring sites for Lake Geneva.

5. STATE OF THE ART ON MICROPLASTICS

The presence of plastics in aquatic environments has emerged over the past few years as a major preoccupation at the world level. Along the pathway plastics take toward the oceans, lakes, including Lake Geneva, are more or less temporary storage zones. The objectives of the present study were to take stock of the current knowledge of the sources, fate and risks induced by microplastics (primary particles or those stemming from degradation of macroscopic plastic waste), so as to set up surveillance adapted to Lake Geneva.

The fate of microplastics in the environment can be summarised in five main processes: degradation (into smaller particles), overlaying by macromolecules or biofilm, aggregation, transport and sedimentation. Knowledge of the direct impacts of microplastics remains very incomplete, making it impossible to identify a general pattern. These impacts concern invertebrates and fish, and have a greater effect on pelagic species than benthic species. The key to exposure resides in trophic behaviour, since microplastics are confused with prey or ingested accidentally. The effects observed in both invertebrates and fish are first physical (congestion, erosion), with physiological consequences on feeding, growth and fertility.

Microplastics can also play a role as vectors of micropollutants or microorganisms. However, for the contaminants recognised as being highly hydrophobic, the concentrations adsorbed to microplastics are undoubtedly high, but remain on the same magnitude as the concentrations observed in sediments, for example: microplastics do not seem to be more efficient vectors of micropollutants than other natural organic particles present in aquatic environments. For microorganisms, the question remains open given that our knowledge remains incomplete.

Today it is therefore difficult to assess the ecological and health risks caused by microplastics, because the knowledge of the effects remains imperfect and considerable shortcomings exist as to the assessment of exposure to these materials. In conclusion, three orientations have been retained from this study: (1) assess the inputs to the lake by its tributaries, (2) monitor impacts (ecosystem exposure) using fish digestive system analysis and (3) evaluate the stock of emerging plastics (shores, beaches) using a participative approach.

6. ANNUAL INSPECTION OF WASTEWATER TREATMENT PLANTS (WTP)

212 wastewater treatment plants (WTP) were operating in 2018 within the territory covered by CIPEL [International Commission for the Protection of the Waters of Lake Geneva] (namely the catchment areas of Lake Geneva and the downstream section of the River Rhône), with a total treatment capacity of 4,645,955 population-equivalents.

The average phosphorous removal efficiency in the catchment area of Lake Geneva has fallen sharply since 2016, as a result of the regional WTP in Viège (canton of Valais) persistently exceeding the discharge requirements, and in 2018 rose to 88% (91% without taking this WTP into account), generating an additional flow of phosphorous of 26 tonnes into Lake Geneva.

Across the territory covered by CIPEL, the flow of post-treatment organic matter discharged expressed by the COD amounted to 10,833 tonnes with a treatment efficiency of 92%. These figures reveal good waste treatment performance levels for organic matter.

This good performance should be weighed against sometimes significant spills. The volumes and loads of these spills are underestimated due to the lack of flow measuring systems in the spillways in the sewage networks. In this context, CIPEL’s recommendation adopted in November 2018 on implementing and updating network diagnostics underlines the importance of gaining a better knowledge of the sewage systems.

Specific flow during dry weather gives a good idea of the infiltration clear water that flows through the wastewater networks. Since 2001, there has been an overall tendency towards a reduction in specific flow during dry weather. In 2018, this flow was estimated to be 250 $L.EH^{-1}.j^{-1}$ across CIPEL’s territory. Efforts made on sewage networks reflected in the improvement of this indicator must be stepped up so as to ensure continuous improvement in the operation of the sewage system.

This chapter also provides a report on the flow and concentration of micropollutants for 16 of the most monitored substances in the discharges of several WTPs, representing 44% of the total waste treatment capacity across the territory. Although the reliability of this report is not comparable to that of the reports provided for phosphorous or organic matter, it contributes to our knowledge of the sources of micropollutants in Lake Geneva and shows the importance of a standardised approach to monitoring the outflow of micropollutants from wastewater plants.