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DOWNSTREAM FISH MIGRATION ALONG THE LOW MEUSE RIVER

Action D1

Definition and evaluation of performance indicators

Milestone – First assessment of indicators

Révision				
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I. Introduction

The goal of this action is to track the indicators and assess the impact of the LIFE4FISH project.

The following indicators will be monitored throughout the project and for five years afterwards:

- Indicator 1: Mortality rate for silver eels throughout the Belgian Lower Meuse
- Indicator 2: Mortality rate for salmon smolts throughout the Belgian Lower Meuse
- Indicator 3: Tons of CO2, NOx and SOx emissions prevented by maintaining renewable energy production on the Belgian Lower Meuse
- Indicator 4: Number of hours per year that turbines are expected to be stopped, cumulated over all sites
- Indicator 5: Number of hydropower production sites using the automated system for predicting downstream migration

II. Indicators assessment

II.1 Indicator 1: Mortality rate for silver eels throughout the Belgian Lower Meuse

II.1.1 Goal for the end of the project

20%

II.1.2 Monitoring method

The estimate utilize the measurements from individuals equipped with radio transmitters, as well as the downstream migration and mortality models created independently of the LIFE Program approved for the Meuse.

II.1.3 Actual value

According to the survey of silver eel migration along the Meuse river in the 2017-18 downstream migration period, the survival along the global study area is equal to 62%. The combine impact of the 6 sites on the stock of migrating fishes is evaluate to 13,5% (due to the impact of the turbine).

⇨ $\underline{I1_{2017\text{-}18} = 20/38 = 53\%}$

In the case of no impact of the turbines, the survival along the same area will be equal to 72%. That means that the actions that will be led on the sites may only achieved a diminution of the global mortality rate from 38% to a minimum of 28%.

II.2 Indicator 2: Mortality rate for salmon smolts throughout the Belgian Lower Meuse

II.2.1 Goal for the end of the project

10%

II.2.2 Monitoring method

The estimate utilize the measurements from individuals equipped with radio transmitters, as well as the downstream migration and mortality models created independently of the LIFE Program approved for the Meuse.

II.2.3 Actual value

According to the survey of smolt migration along the Meuse river in the 2017 downstream migration period, the survival along the global study area is equal to 0%. However, the combine impact of the 6 sites on the stock of migrating fishes is evaluate to 16,1% (1% due to the impact of the turbine and 15,6% that seems to stop their migration directly upstream the site).

⇨ ***$I2_{2017}$ = 10/100 = 10%***

In the case of no impact of both the turbines and the sites, the survival along the same area will be equal to 7%. That means that the actions that will be led on the sites may only achieved a diminution of the global mortality rate from 100% to a minimum of 93%. However, more important discharges along the migration period may also help to decrease the impact of the reaches as well as of the Canal Albert water intake.

II.3 Indicator 3: Tons of CO2, NOx and SOx emissions prevented by maintaining renewable energy production on the Belgian Lower Meuse

II.3.1 Goal for the end of the project

237,5 GWh produced annually for all sites, preventing 71,041 tons of CO2, 93 tons of NOx and 178 tons of SOx from being emitted each year. Baseline adopted according to Eurelectric (2012), the average European kWh results in the following emissions: 359.7 g CO2/kWh, 0.47 g NOx/kWh, 0.9 g SOx/kWh.

II.3.2 Monitoring method

Production data provided by the power plant control systems

II.3.3 Actual value

In 2017, the 6 sites produced together 175,9 GWh (18,5 GWh by CHG; 23,3 GWh by CHA; 30,0 GWh by CHN; 27,4 GWh by CHR; 36,0 GWh by CHM and 40,8 GWh by CHL). In 2018, the 6 sites produced together 208,1 GWh (19,1 GWh by CHG; 25,4 GWh by CHA; 34,8 GWh by CHN; 32,6 GWh by CHR; 48,0 GWh by CHM and 48,1 GWh by CHL).

⇨ ***$I3_{2017}$ = 175,9/237,5 = 74% ; $I3_{2018}$ = 208,1/237,5 = 88%***

The next figures show the evolution of the daily production within the year for 2017 and 2018.

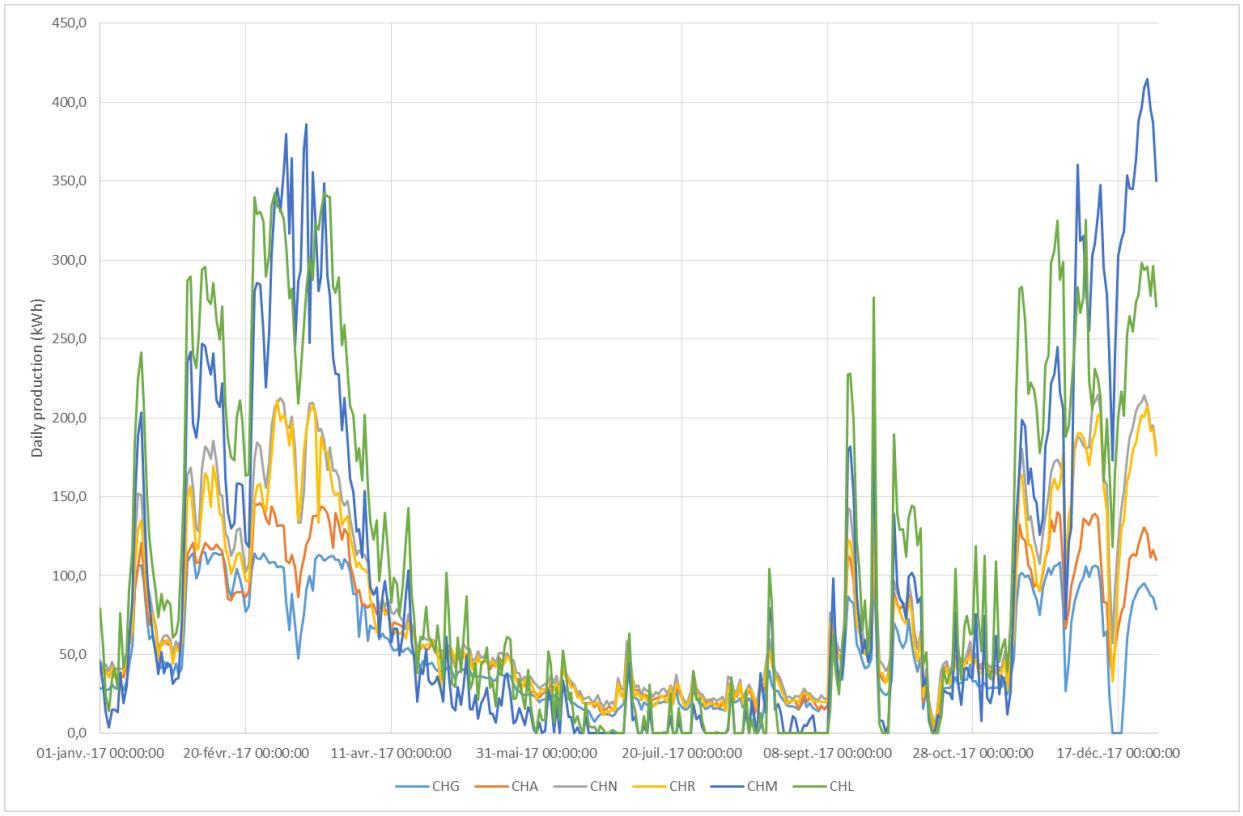

Figure 1. Evolution of the daily production on the 6 sites along 2017

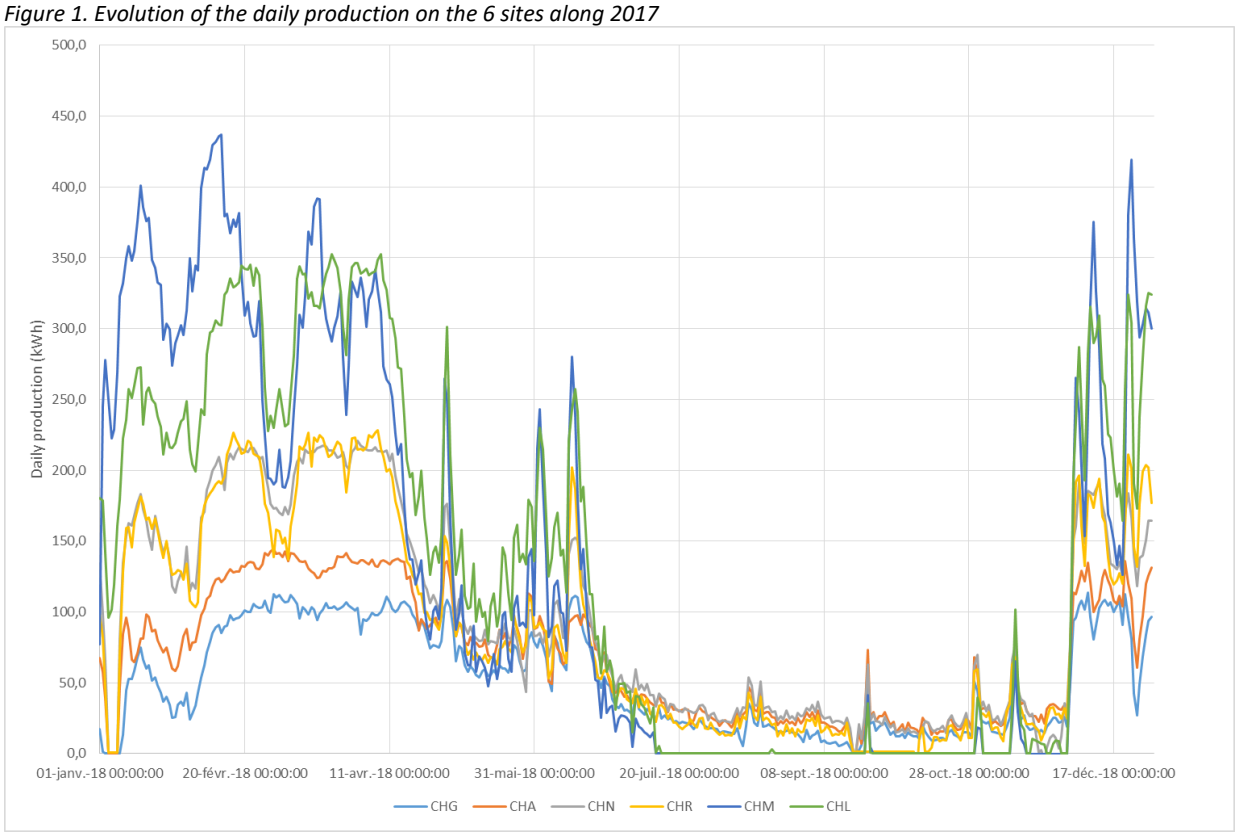

Figure 2. Evolution of the daily production on the 6 sites along 2018

II.4 Indicator 4: Number of hours per year that turbines are expected to be stopped, cumulated over all sites

II.4.1 Goal for the end of the project

900 hours per year accounting for all the 6 sites.

II.4.2 Monitoring method

Production data provided by the power plant control systems

II.4.3 Actual value

In 2017, the 6 sites stopped together 157 days (7 days for CHG; 1 day for CHA; 0 day for CHN; 1 day for CHR; 69 days for CHM and 74 days for CHL). In 2018, the 6 sites stopped together 320 days (11 days for CHG; 6 days for CHA; 11 days for CHN; 30 days for CHR; 136 days for CHM and 126 days for CHL).

⇨ ***$I4_{2017}$ = 37,5/157 = 24% ; $I4_{2018}$ = 37,5/320 = 12%***

The next figures show the repartition of the daily stops of the turbines within the year for 2017 and 2018.

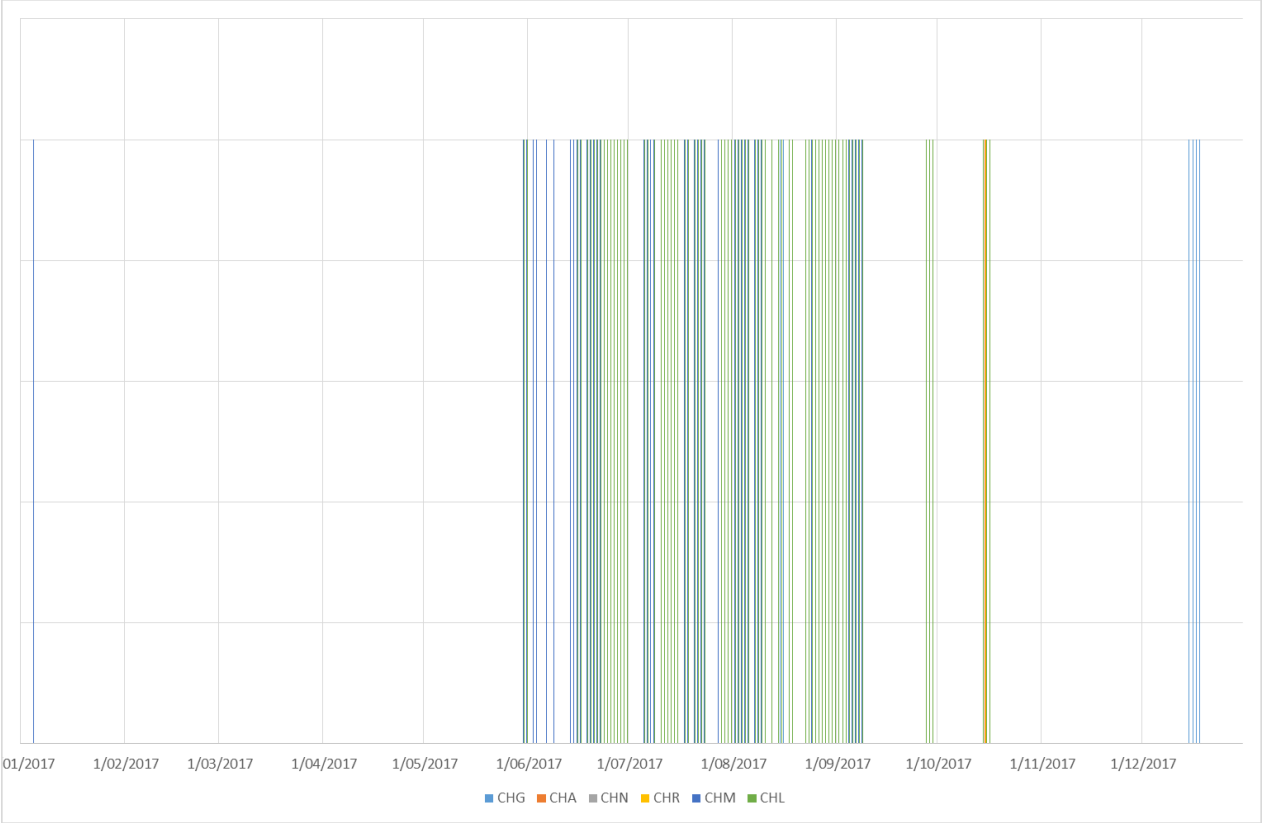

Figure 3. Repartition of turbines stops along the year in 2017

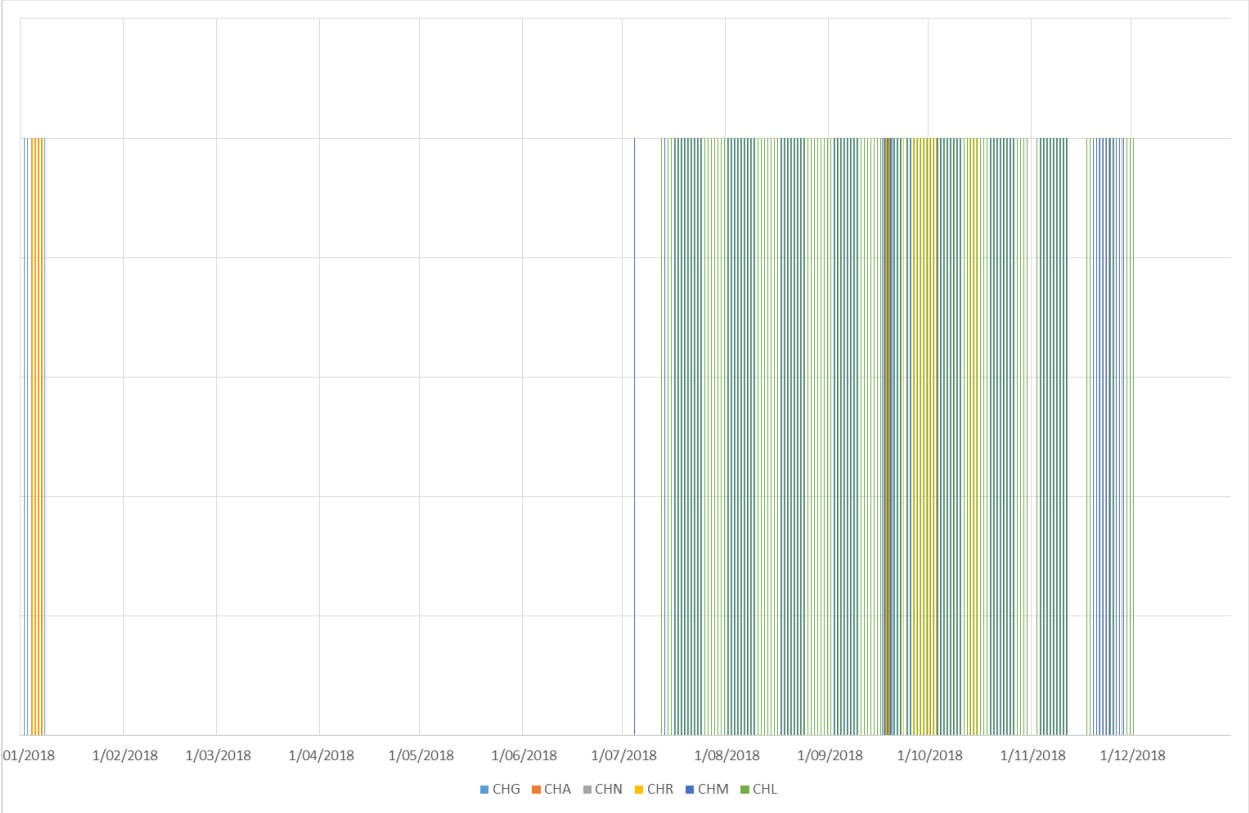

Figure 4. Repartition of turbines stops along the year in 2018

II.5 Indicator 5: Number of hydropower production sites using the automated system for predicting downstream migration

II.5.1 Goal for the end of the project

6 sites using the automated system.

II.5.2 Monitoring method

Number of sites equipped with the system and/or operating licenses sold

II.5.3 Actual value

At this stage of the program, 0 system of hydropower control based on downstream migration prediction have been started. The first system is planned to be in place on the Andenne site within the 15/08/19.

⇨ ***I5 = 0/6 = 0%***