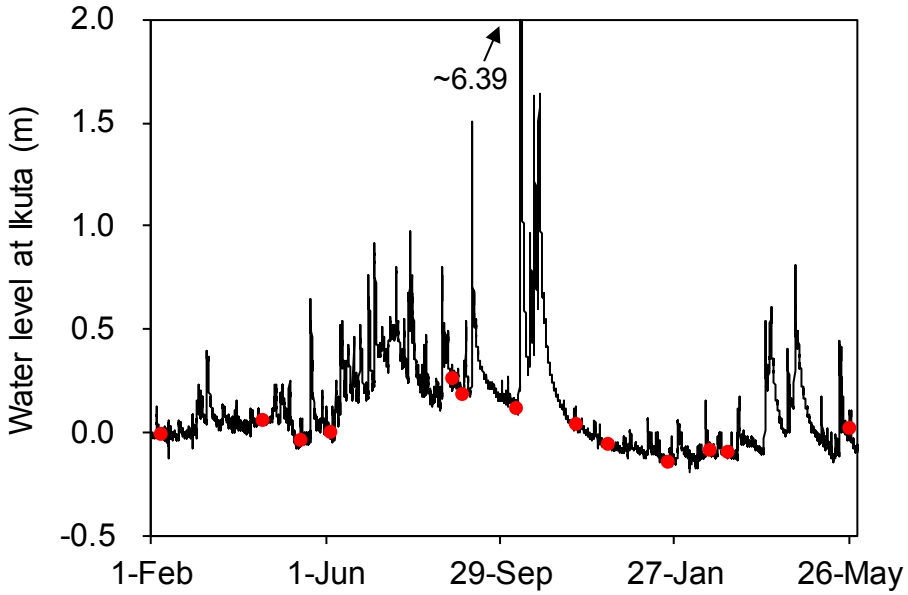

Fig. S1 Water levels at Ikuta observation station near Sta. T in the Shinano River and sampling day (red circles). The water level was shown as a relative value based on the value on 1 February 2019 (0 m).

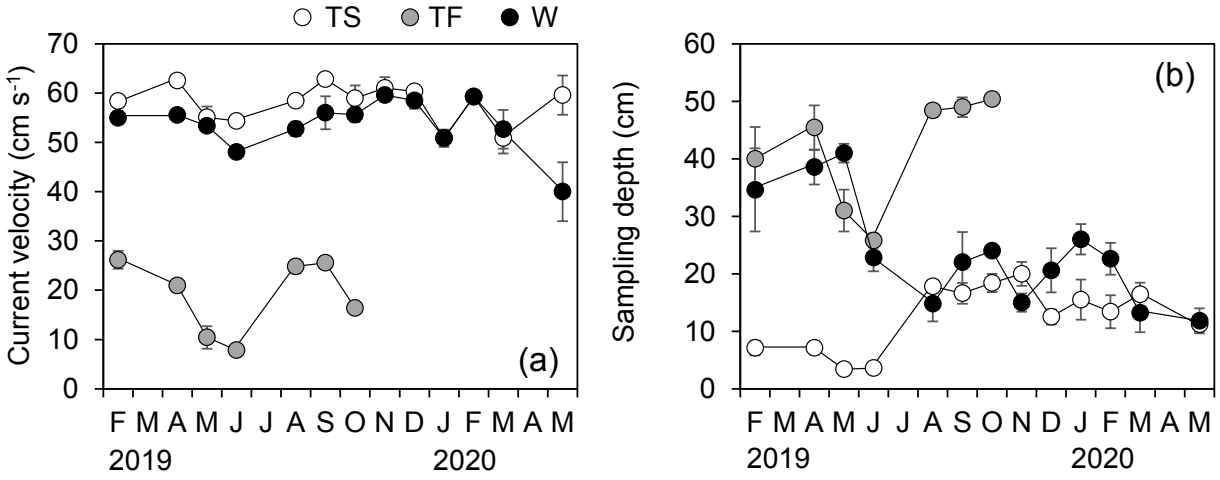

Fig. S2 Seasonal variations of (a) current velocity and (b) sampling depth in the Shinano River during the study period. Error bars represent ± 1 SE.

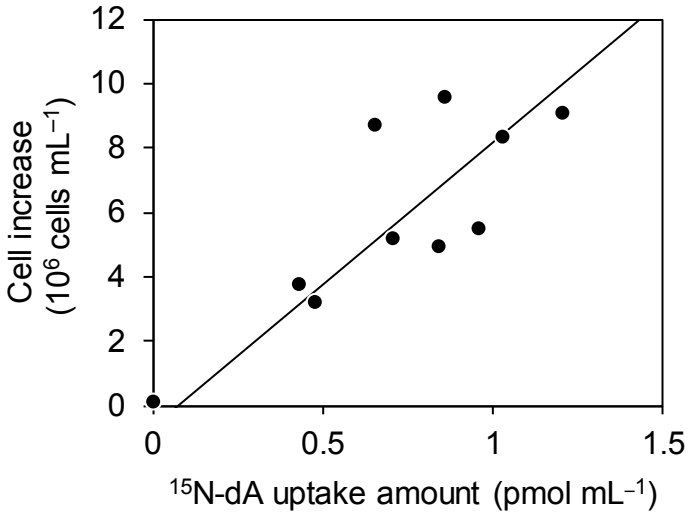

Fig. S3 Correlation between cell increase and ^{15}N-deoxyadenosine (^{15}N-dA) incorporation amount at Sta. TS, TF and W of the Shinano River, Japan (n = 10, r^2 = 0.67, P < 0.01). The solid line indicates the standard major axis model II linear regression (Legendre 2001): [Cell increase] = 8.8 × [^{15}N-dA] – 617

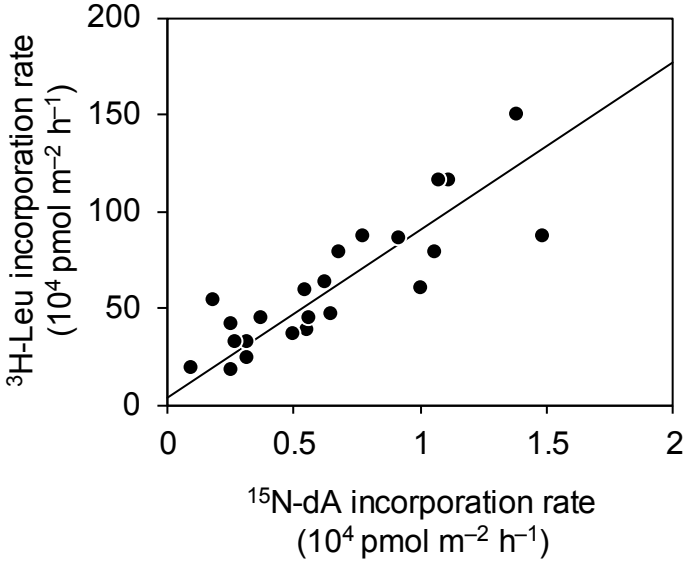

Fig. S4 Correlation of ^{3}H-Leu and ^{15}N-dA incorporation rates (n = 23, r^2 = 0.73, P < 0.01). The solid line indicates the standard major axis model II linear regression (Legendre 2001): [^{3}H-Leu] = 87 × [^{15}N-dA] − 3.7×10^4

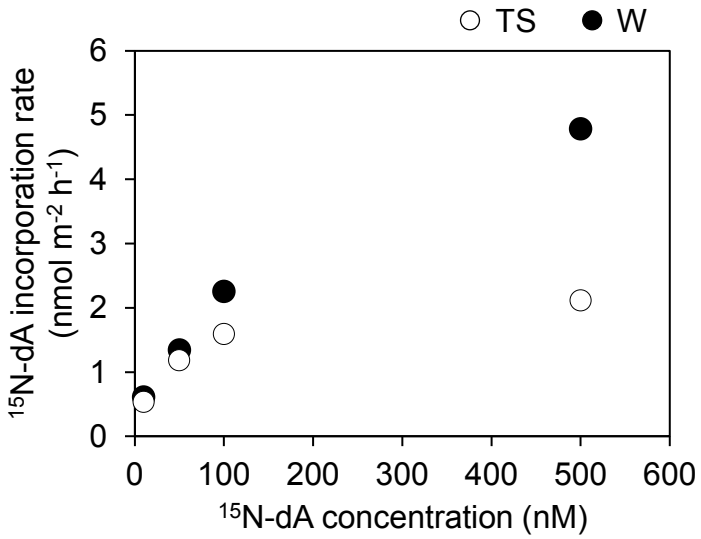

Fig. S5 Dependency of ^{15}N-deoxyadenosine (^{15}N-dA) incorporation rate on added ^{15}N-dA concentration. The experiment was conducted using the biofilm samples collected at Sta. TS and W on 22 January 2020. To clarify the effect of ^{15}N-dA concentration on the incorporation rate, we used biofilm suspensions for incubation, and the same samples were incubated at different concentrations. Before the incubation, 25 cm^2 of the stone surface were brushed by using a toothbrush and a grid of 5 cm × 5 cm, rinsed by and suspended in filtered river water (0.45-µm pore size PTFE membrane filters) of 50 mL. One mL of the suspension was incubated with final concentrations 10, 50, 100, and 500-nM of ^{15}N-dA for 3 hours under the dark condition at in situ temperature. After the incubation, the suspension was filtered onto a 0.2-µm pore size PTFE membrane filter and rinsed with 2 mL of 70 % ethanol to quench bacterial metabolism. The filters were used for measuring the ^{15}N-dA incorporation rate.