

Memo: Computing time to hatching

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Time to hatching is based on the exposure of the eggs to daily temperatures. There are two available methods for this: accumulating temperature units (ATU's) or accumulating percent development.

ATU Method:

Temperature units are accumulated on a daily basis. After reaching the specified value, the egg hatches. Default value for SacPAS Fish model is 400 ATUs from fertilization to hatching. This can be changed by the user. Hatching is approximately half way through the egg development period.

Percentage Method:

A given temperature results in a small percentage increase in development. When the accumulated percentage is 100%, that day is the hatching day.

The daily accumulated percentage formula is based on the log-inverse form of the Bělehrádek equation, calibrated for Chinook salmon eggs (Alderdice and Velsen 1978):

$$\ln(P) = \ln(k) + b(\ln(t - c))$$

where:

$$k = 0.08646$$

$$b = 1.23473$$

$$c = -2.26721$$

P = daily development rate

t = daily temperature

Alderdice, D. F., and F. P. J. Velsen. 1978. Relation between temperature and incubation time for eggs of Chinook Salmon (*Oncorhynchus tshawytscha*). Journal of the Fisheries Research Board of Canada 35(1):69-75.