Dilution Determination Worksheet for use with the RIPDES General Permit for Non-Contact Cooling Water Discharges

Dilution Factor (DF)

A DF for sites that discharge to freshwater receiving waters in Rhode Island is calculated using the equation below (Item 4). Alternate calculation methods for DFs may be acceptable if approved by the DEM. A DF for sites that discharge to saltwater receiving waters or non-flowing freshwater bodies (ponds or lakes) in Rhode Island is assumed to be 1:1, unless otherwise approved on a case-by-case basis by the DEM.

1. Using StreamStats: This online application is appropriate for determining drainage area ratios for nearby gages and uses the 7Q10s for available gages from the U.S. Geological Gazetteer reports (1984 Wandle et al.). StreamStats is available at:

   http://water.usgs.gov/osw/streamstats

2. Follow the instructions in StreamStats. The location chosen must be where the NCCW discharges to the receiving water body. When the location has been chosen and the basin delineated, select the "Low-Flow Statistics" for the Regression Based Scenario. Then click Continue. This will bring up the Build a Report section. Again, click Continue.

3. Include a printout or otherwise attach the StreamStats Report with the NOI. An example StreamStats Report is included on the following page. The report should contain the 7 Day 10 Year Low Flow value for the selected location.

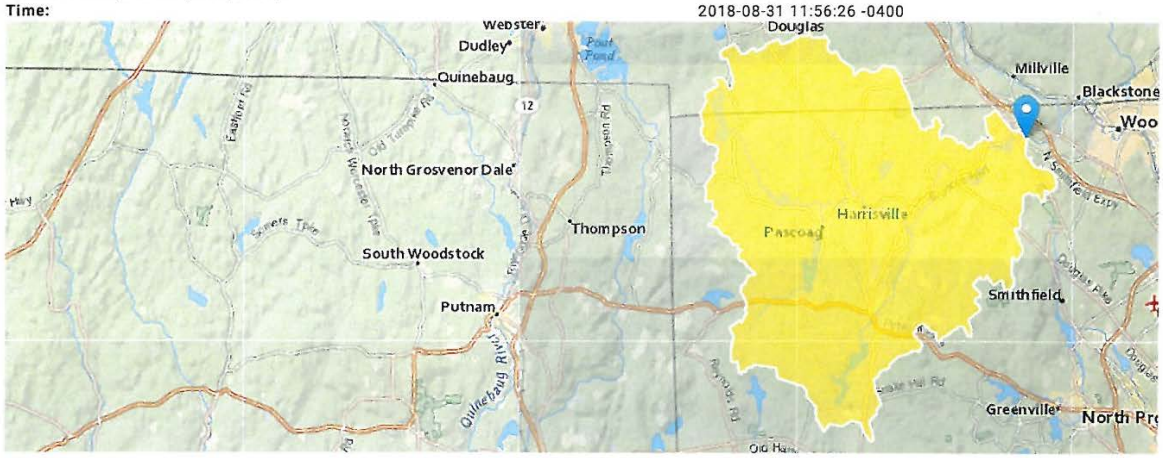
4. Calculate the dilution factor. 7Q10 indicates the "7 Day 10 Year Low Flow" as printed on the StreamStats Report. Use the following formula:

$$DF = \frac{\{(7Q10) + (\text{Total Combined System Design Flow})\}}{\{\text{Total Combined System Design Flow}\}} =$$

EXAMPLE STREAMSTATS REPORT

StreamStats Report

Region ID:	RI
Workspace ID:	RI20180831155611140000
Clicked Point (Latitude, Longitude):	41.99838, -71.57297
Time:	2018-08-31 11:56:26 -0400



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	89.8	square miles
STRDENED	Stream Density -- total length of streams divided by drainage area, edited from NHD	2.21	miles per square mile

Low-Flow Statistics Parameters [100 Percent (89.8 square miles) Statewide Low Flow 2014 5010]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	89.8	square miles	0.52	294
STRDENED	Stream Density Edited	2.21	miles per square mile	0.94	3.49

Low-Flow Statistics Flow Report [100 Percent (89.8 square miles) Statewide Low Flow 2014 5010]

PII: Prediction Interval-Lower, Plu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	PII	Plu
7 Day 2 Year Low Flow	18.9	ft^3/s	4.08	87.4
7 Day 10 Year Low Flow	9.15	ft^3/s	1.17	71.3

Low-Flow Statistics Citations

Bent, G.C., Steeves, P.A., and Waite, A.M.,2014, Equations for estimating selected streamflow statistics in Rhode Island: U.S. Geological Survey Scientific Investigations Report 2014–5010, 65 p. (http://dx.doi.org/10.3133/sir20145010)