Documentation for EFDC_DSI-WASP7 Linkage
Overview

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Dynamic Solutions International (DSI) (www.ds-intl.biz) has developed step-by-step procedures needed to create an EFDC hydrodynamic model results binary file (*.HYD) that is formatted for linkage as an input file to the WASP7 water quality model. These technical memorandums provide the information needed and example problems to show the step-by-step procedures needed to successfully create and apply an EFDC project to export a hydrodynamic file (*.HYD) for linkage as an input file for a WASP7 water quality model project. The description contained in the documents assumes that the user has completed the setup of a working EFDC project for a hydrodynamic model and wishes to generate a binary HYD file as input to a WASP7 water quality model. The user is reminded that the EFDC model and the EFDC_Explorer interface can be obtained from DSI's EFDC_Explorer web site (www.eemodelingsystem.com) includes a fully functioning coupled sediment transport and water quality model in a single EFDC model source code. The EFDC water quality model is comparable to the state variables included in the WASP7 water quality model.

Two example problems are developed by DSI to show how an EFDC model can be setup and linked to a WASP7 water quality model.

Example Problem#1. A 1D river problem for BOD, nitrogen and dissolved oxygen is setup in EFDC as a hydrodynamic, sediment transport and water quality model. The hydrodynamic results file (HYD) is then used to setup the same 1D river problem in WASP7. The results of the EFDC and WASP7 water quality models are compared to a steady state analytical model as a benchmark solution for the 1D river problem. All input files needed for the EFDC and the WASP7 models are provided for the 1D river problem.

Example Problem#2. A 3D time variable lake model for hydrodynamics, sediment and water quality is setup as an EFDC model. The hydrodynamic results file (HYD) is then used to setup the same 3D lake model in WASP7. All input files needed for the EFDC and the WASP7 models are provided for the 3D lake model problem.

DSI recommends using the EFDC_DSI coupled hydrodynamic and water quality model instead of the EFDC/WASP linkage process because:

1. The advantage of quicker run times for a decoupled hydrodynamic model from the water quality transport and kinetics is not valid as the WASP code alone runs 3 to 8 times **SLOWER** than the fully coupled EFDC_DSI model with water quality. See Table 1 for an example.
2. The pre/post processing tools of EFDC_Explorer significantly streamline the modeling process allowing the user to spend more time in producing a better model rather than spending a lot of time with basic model/linkage mechanics.
3. For a similarly configured water quality model, the EFDC_DSI results are nearly identical to WASP. See Figure 1.

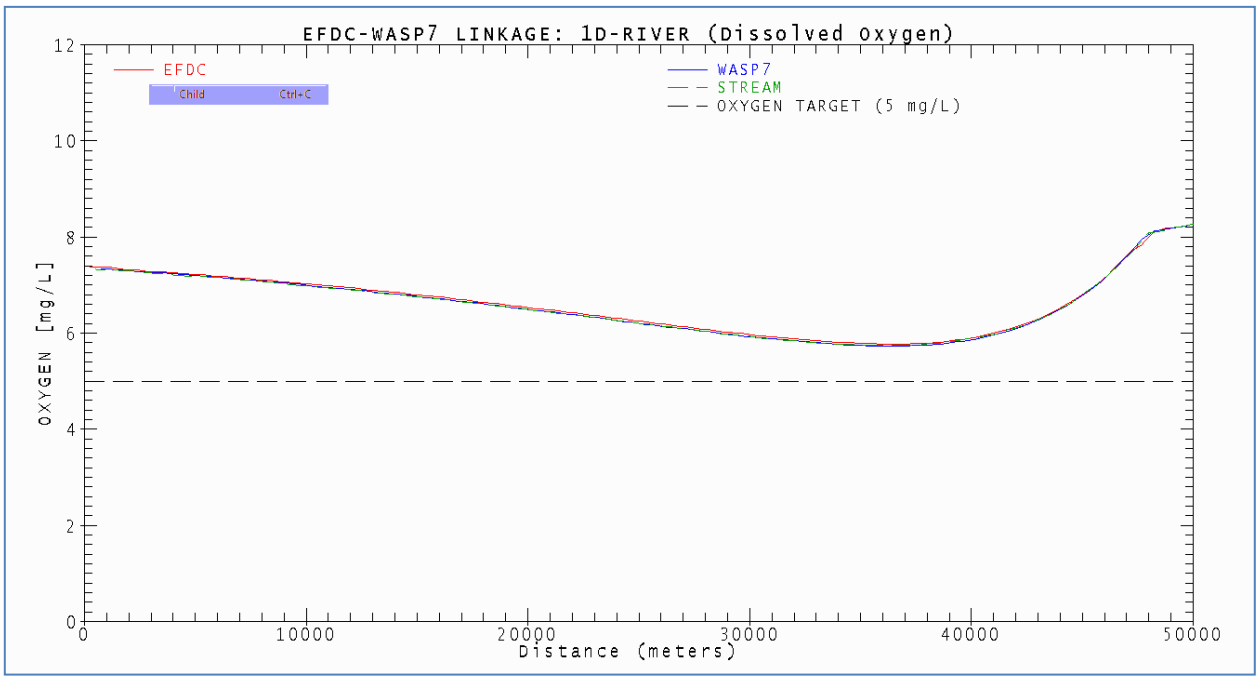

Figure 1 River 1D dissolved oxygen (D.O.) for the analytical solution compared to the EFDC_DSI and WASP computed results. Note: The results for EFDC_DSI and WASP are nearly identical.

Table 1 EFDC_DSI and WASP runtimes.

Water Quality Model Run Times

Number of Horizontal Cells	195
Number of Layers	10
Simulation Period	1 Year

	Number of Processors	CPU Time Used (Hrs)	Speed[1]
WASP	1	6.43	-
EFDC with Hydrodynamics and Water Quality	1	2.12	3.0
	2	1.38	4.7
	4	1.07	6.0

[1] Ratio of WASP run time to EFDC_DSI.
e.g. EFDC_DSI with 4 processors is 6 times faster than WASP