Example 1: Pesticide and Estuary Remediation Assessment

The James River Estuary in Virginia (See Fig. 1) was contaminated by pesticide, Kepone. Through the food chain, fish was contaminated and fishing was banned (Fig. 2). To remediate the estuary, field data were collected and modeling was performed. In this case, two-dimensional sediment and contaminant transport code, FETRA developed by Dr. Yasuo Onishi was used to predict the pesticide concentrations in water when contaminated bottom sediment was to be dredged in specific areas. Figure 3 shows predicted Kepone results, showing reduced Kepone concentrations in water for each of specific areas to be dredged. The modeling identifies the effectiveness of dredging contaminate bottom sediment to reduce the Kepone concentration in water, thus to fish. The modeling assessment indicates that to reduce the Kepone concentration in the estuary, a large area must be dredged. The modeling also indicates that the James River is effective to self-cleaning itself by burying contaminated bottom sediment by cleaner sediments, and much remains so even under a storm condition. Thus, a decision was made not to dredge the bottom sediment, and let the river clean itself. The subsequent monitoring proved the correctness of the model results.
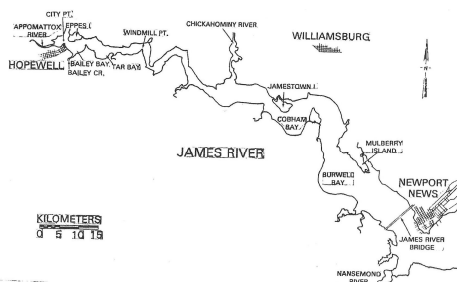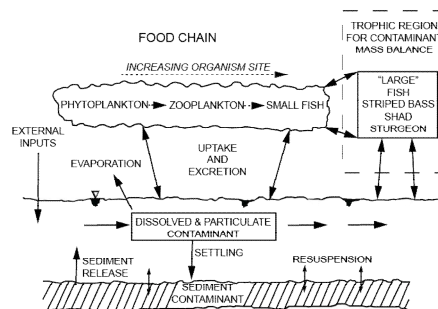

Fig. 1. The James River Estuary, Virginia
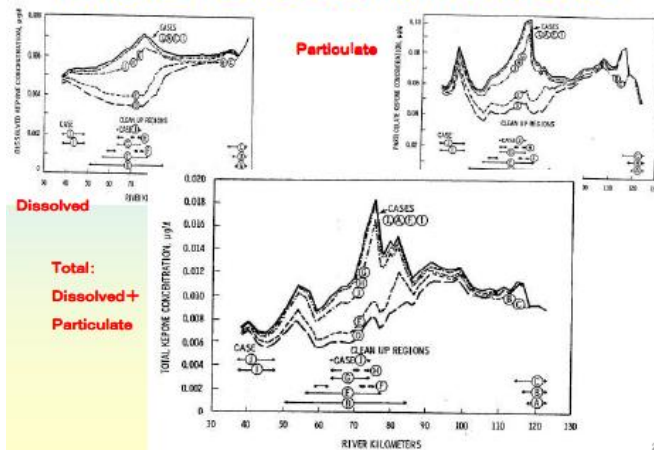

Fig. 2.. Fresh Water Food Chain

Fig. 3. Model Predictions of Various Dredging Scenarios