Ecosystem-Scale Selenium Modeling in Support of Fish and Wildlife Criteria Development for the San Francisco Bay-Delta Estuary, California

Administrative Report

Figures 14 through 28

U.S. Department of the Interior
U.S. Geological Survey
December, 2010

Find the full report and other attachments at http://www.epa.gov/region9/water/ctr

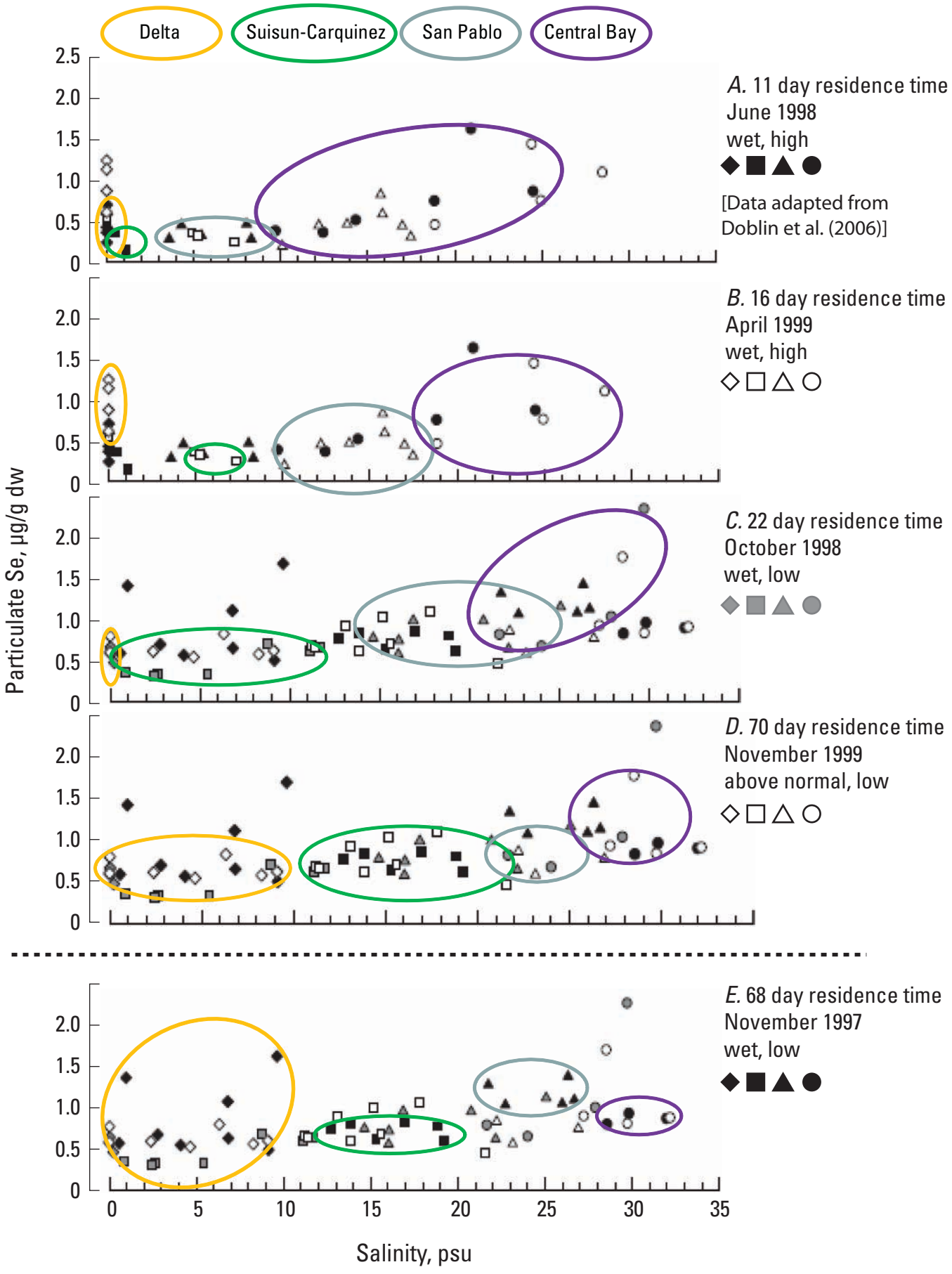
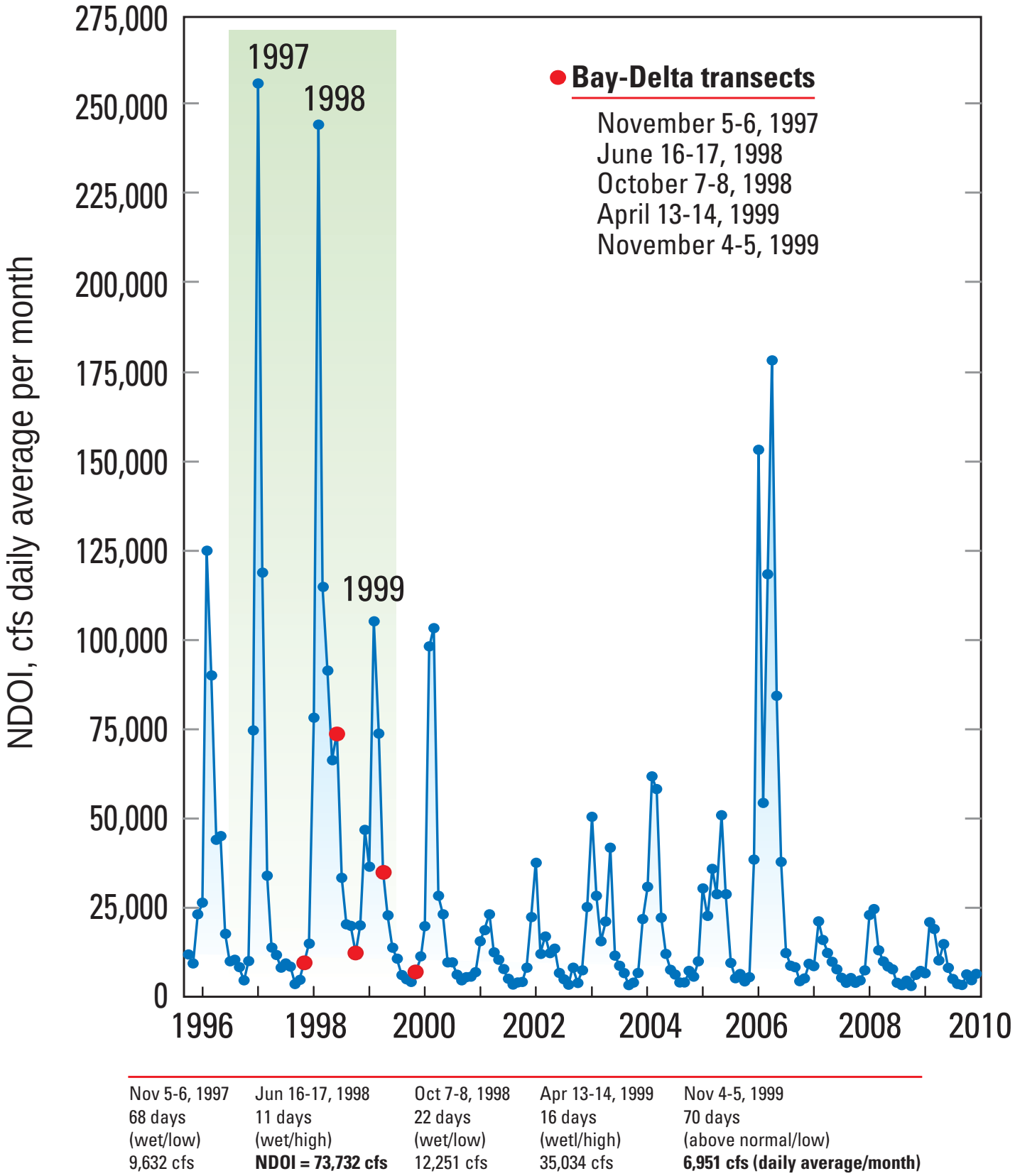


Figure 14. Profiles of hydrodynamically categorized suspended particulate material selenium concentrations from transects during 1997-1999. [Profiles are arranged in order of increasing residence time, with the profile from November, 1997 separated out (see text for explanation).]



Nov 5-6, 1997	Jun 16-17, 1998	Oct 7-8, 1998	Apr 13-14, 1999	Nov 4-5, 1999
68 days	11 days	22 days	16 days	70 days
(wet/low)	(wet/high)	(wet/low)	(wetl/high)	(above normal/low)
9,632 cfs	**NDOI = 73,732 cfs**	12,251 cfs	35,034 cfs	**6,951 cfs (daily average/month)**

Figure 15. Flow conditions in the Bay-Delta (1996-2009) with reference to sampling transects by Cutter and Cutter (2004) and Doblin et al. (2006) (1997-1999).

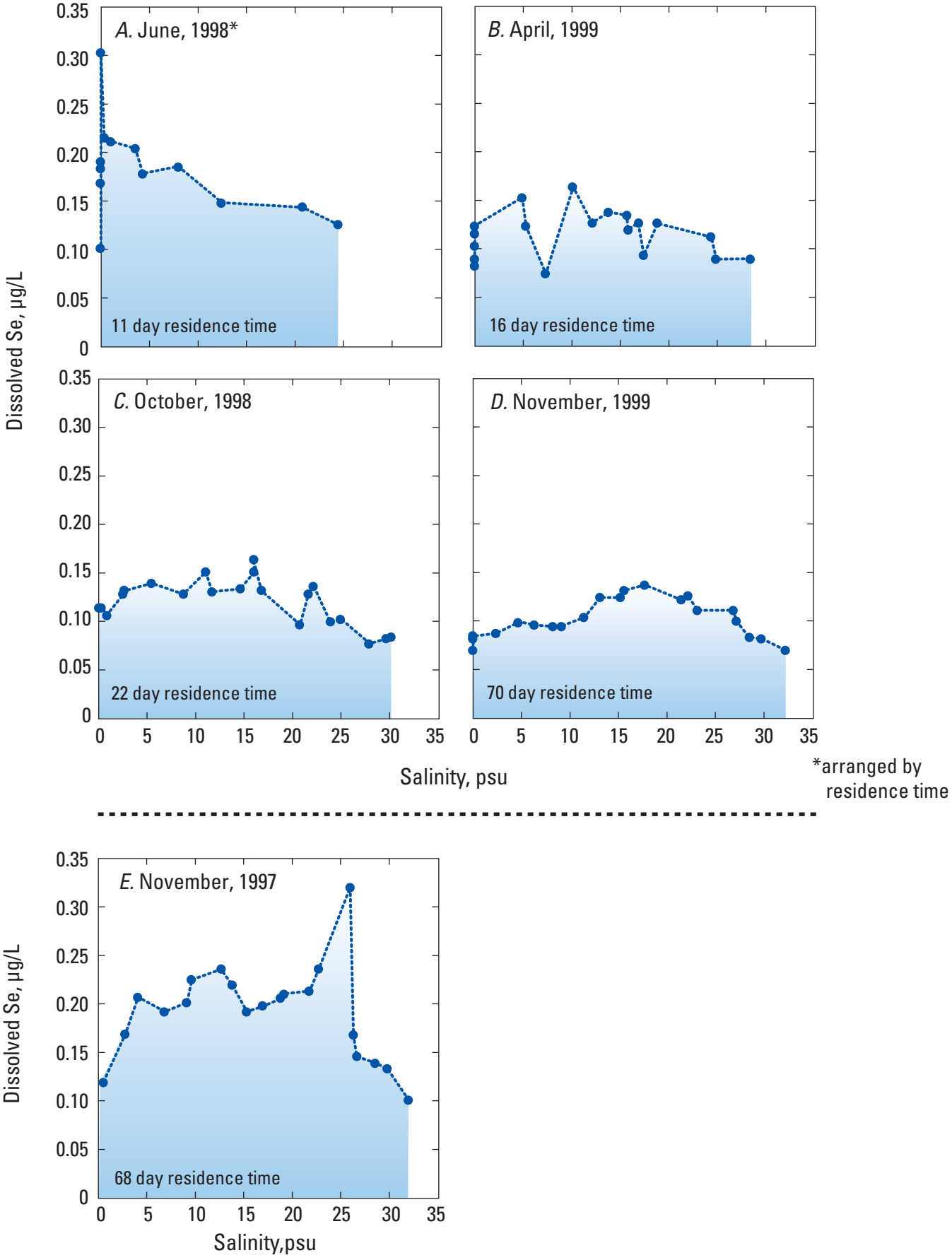


Figure 16. Profiles of observed dissolved selenium concentrations for transects across the estuary salinity gradient during 1997-1999. [Profiles are arranged in order of increasing residence time, with the profile from November, 1997 separated out (see text for explanation).]

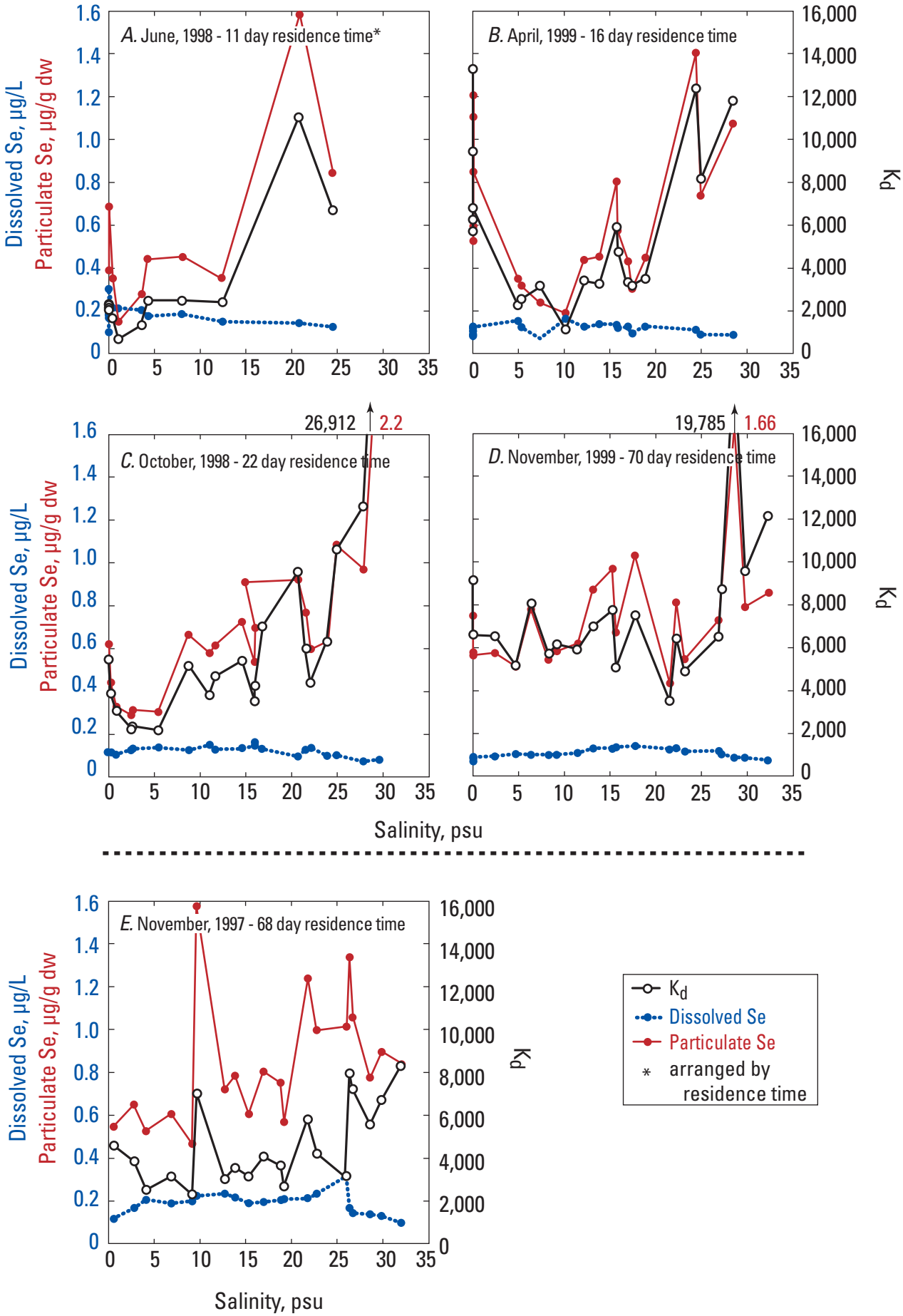


Figure 17. Profiles of observed dissolved and suspended particulate material selenium concentrations and calculated K_ds for transects across the estuary salinity gradient during 1997-1999. [Profiles are arranged in order of increasing residence time, with the profile from November, 1997 separated out (see text for explanation).]

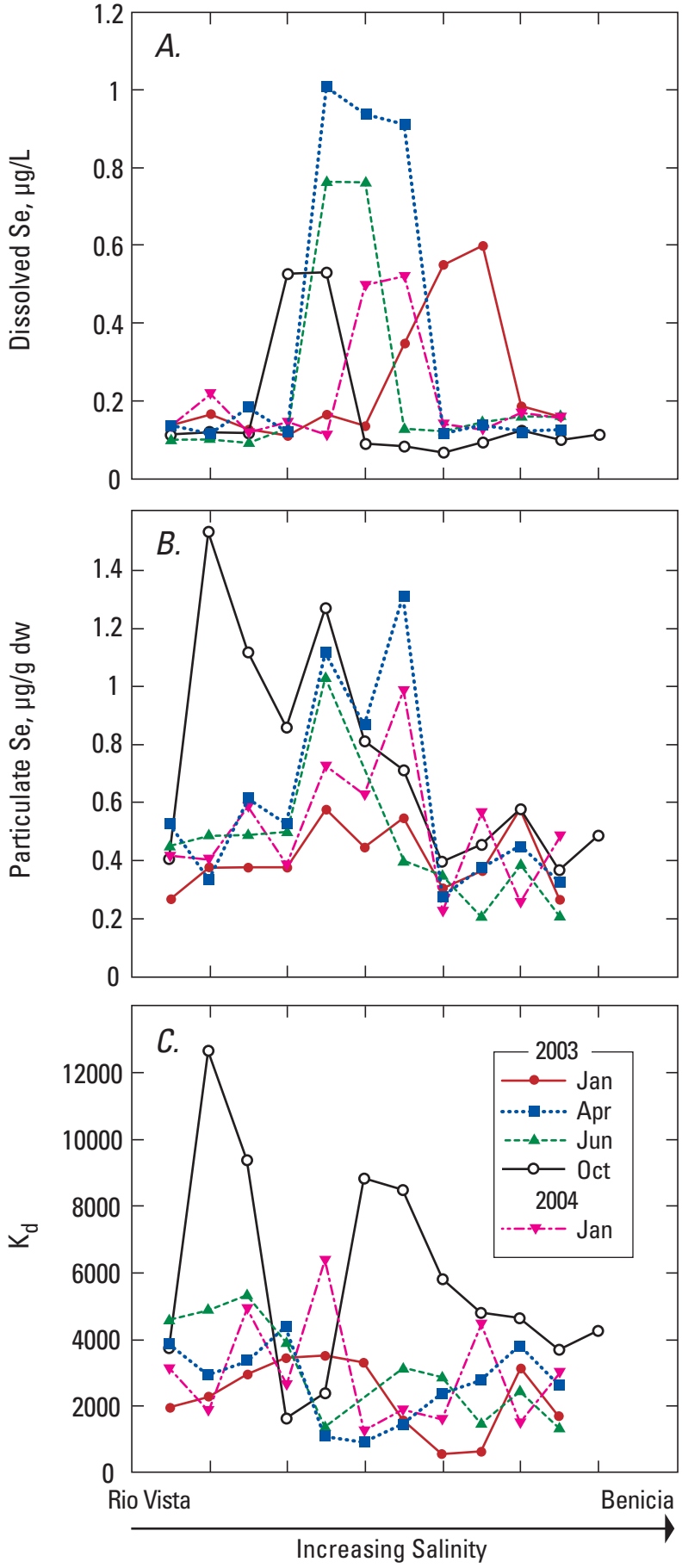


Figure 18. Profiles of observed dissolved (*A*) and suspended particulate material (*B*) selenium concentrations and calculated K_ds (*C*) for transects across the salinity gradient from Rio Vista and Stockton to Benicia, California (2003-2004).

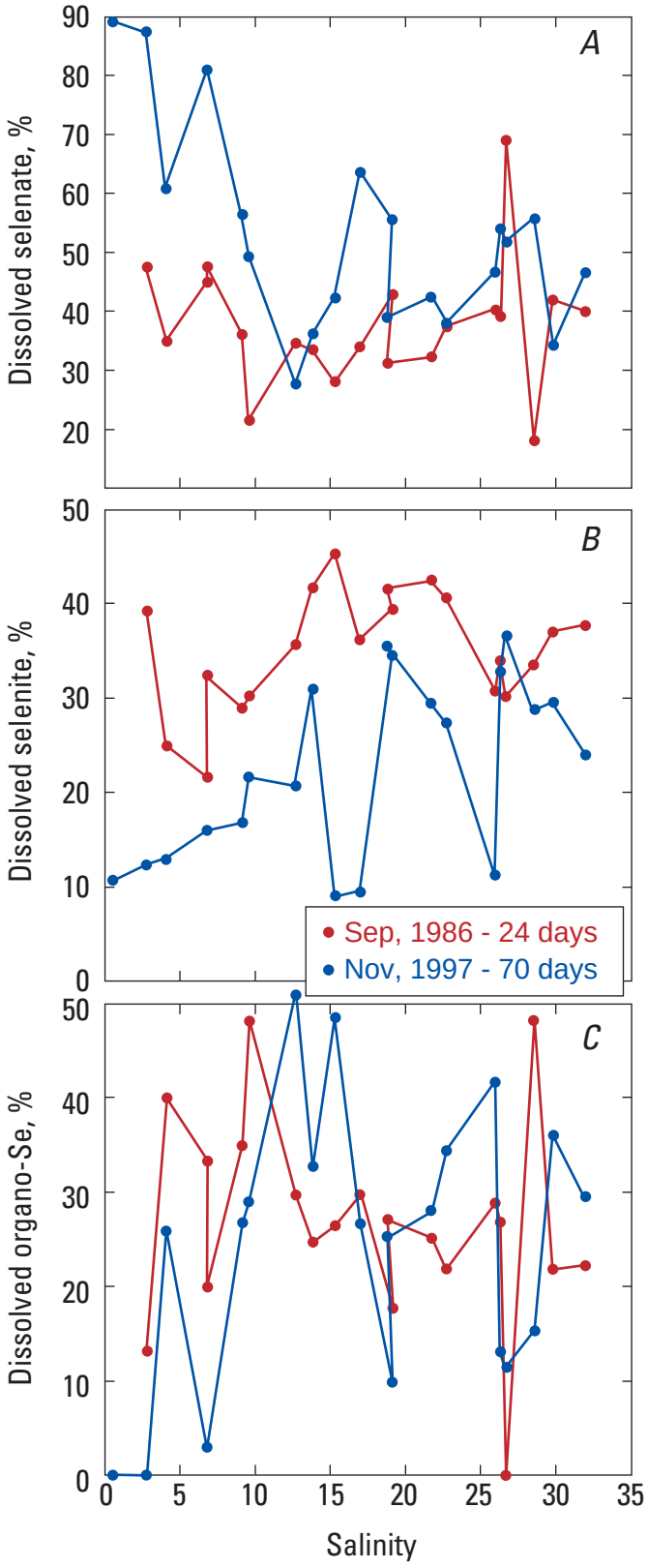


Figure 19. Profiles of observed dissolved selenium speciation [selenate (*A*), selenite (*B*), and organo-Se (*C*)] for transects across the estuary salinity gradient for September, 1986 and November, 1997.

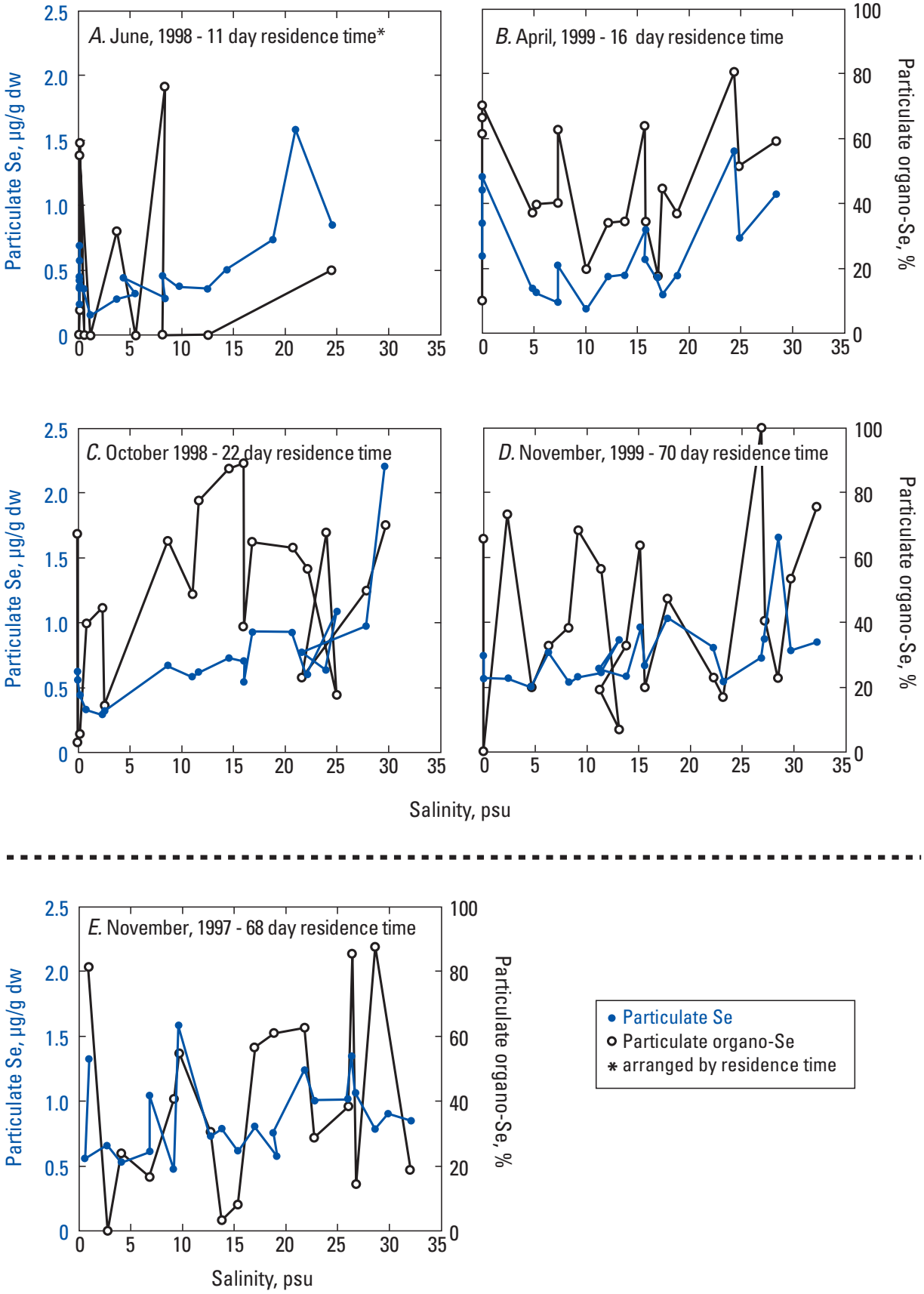


Figure 20. Profiles of observed suspended particulate material selenium concentrations and the observed percentages of suspended particulate organo-Se for transects across the estuary salinity gradient during 1997-1999. [Profiles are arranged in order of increasing residence time, with the profile from November, 1997 separated out (see text for explanation).]

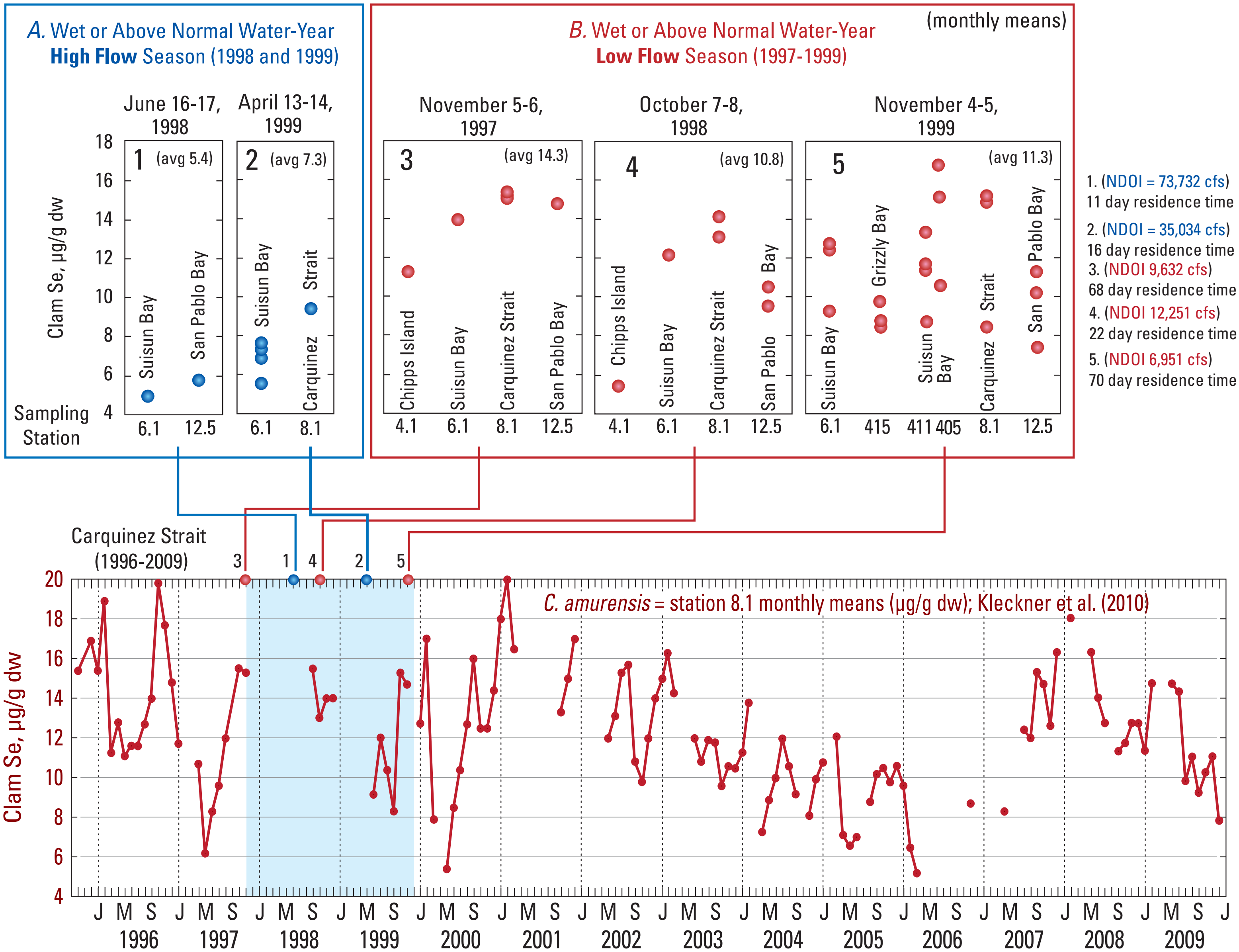


Figure 21. Observed selenium concentrations for *C. amurensis* collected from USGS monitoring station 8.1 at Carquinez Strait (1996-2009). Insets (*A* and *B*) show selenium concentrations in *C. amurensis* in the highlighted period from 1997 to 1999 when selenium transects were collected.

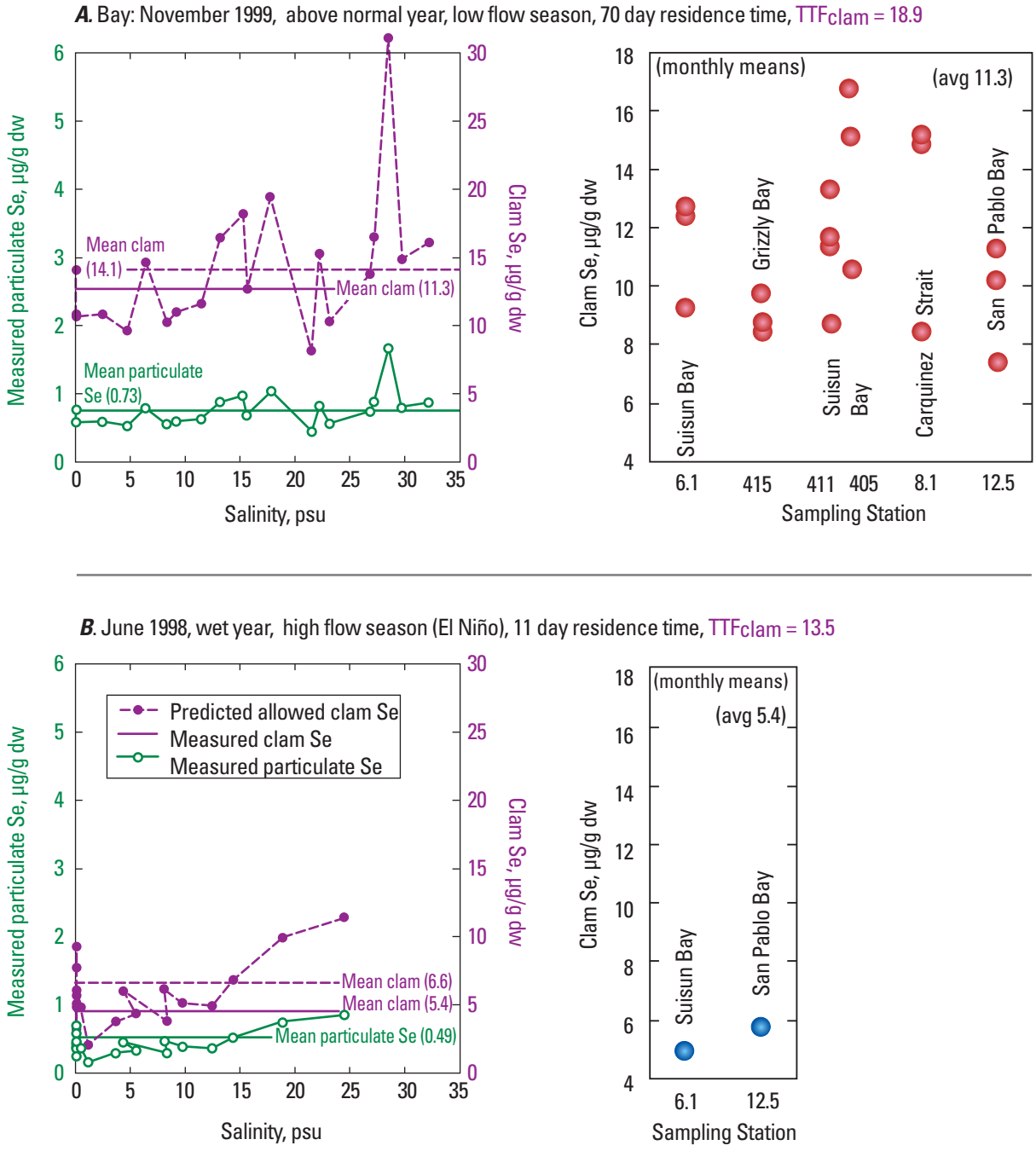


Figure 22. Predicted *C. amurensis* selenium concentrations for November, 1999 and June, 1998 and observed selenium concentrations in *C. amurensis* collected from several USGS monitoring stations for the same time periods as the transects in 1999 and 1998.

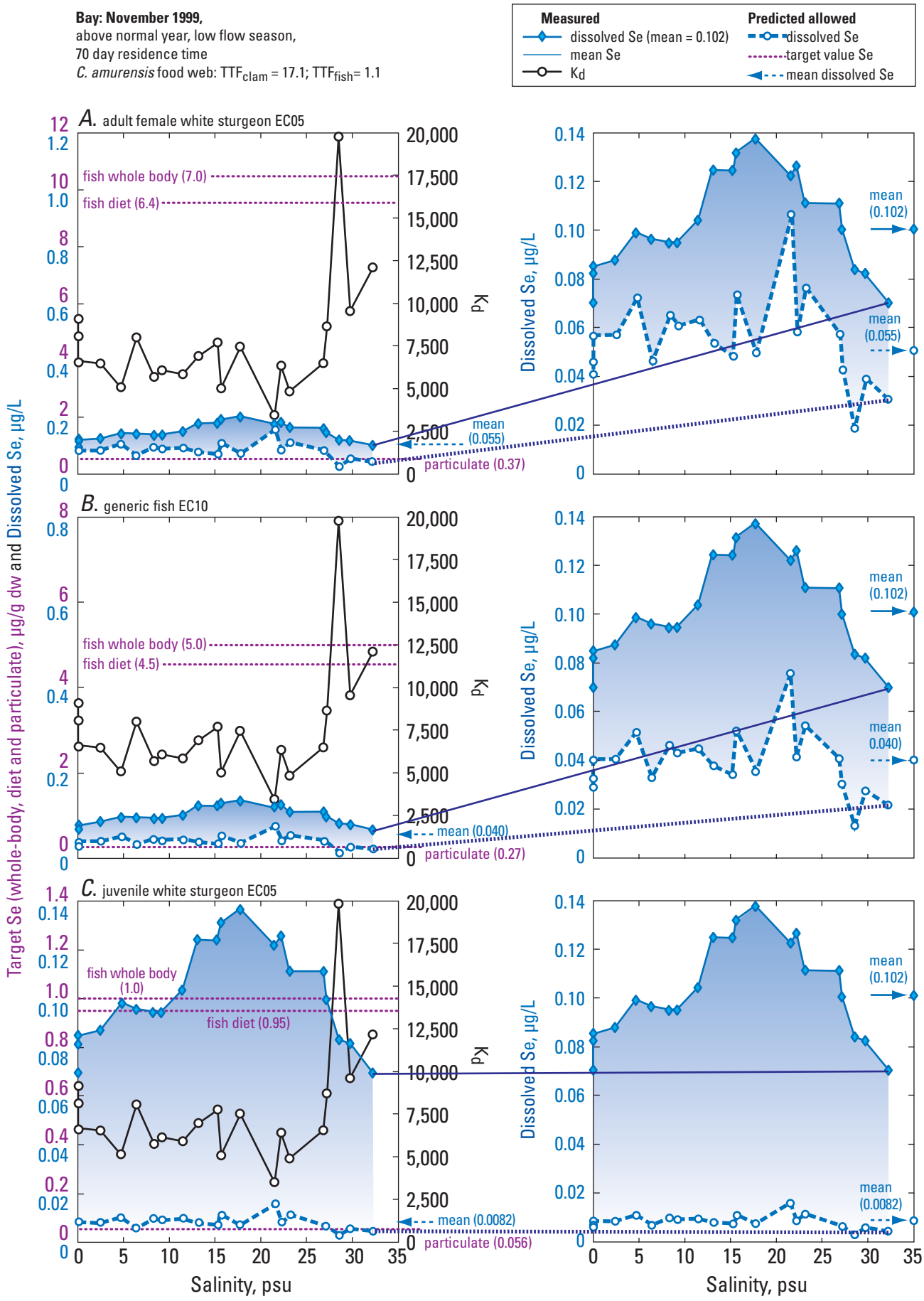


Figure 23. Modeled scenarios for protection of sturgeon and a generic fish showing predicted allowable dissolved, suspended particulate material, and dietary selenium concentrations for the Bay. [Predicted allowable selenium concentrations are keyed to calculated K_ds across the estuary for November 1999 (above normal year, low flow season). Measured dissolved and suspended particulate material selenium concentrations are given for comparison.]

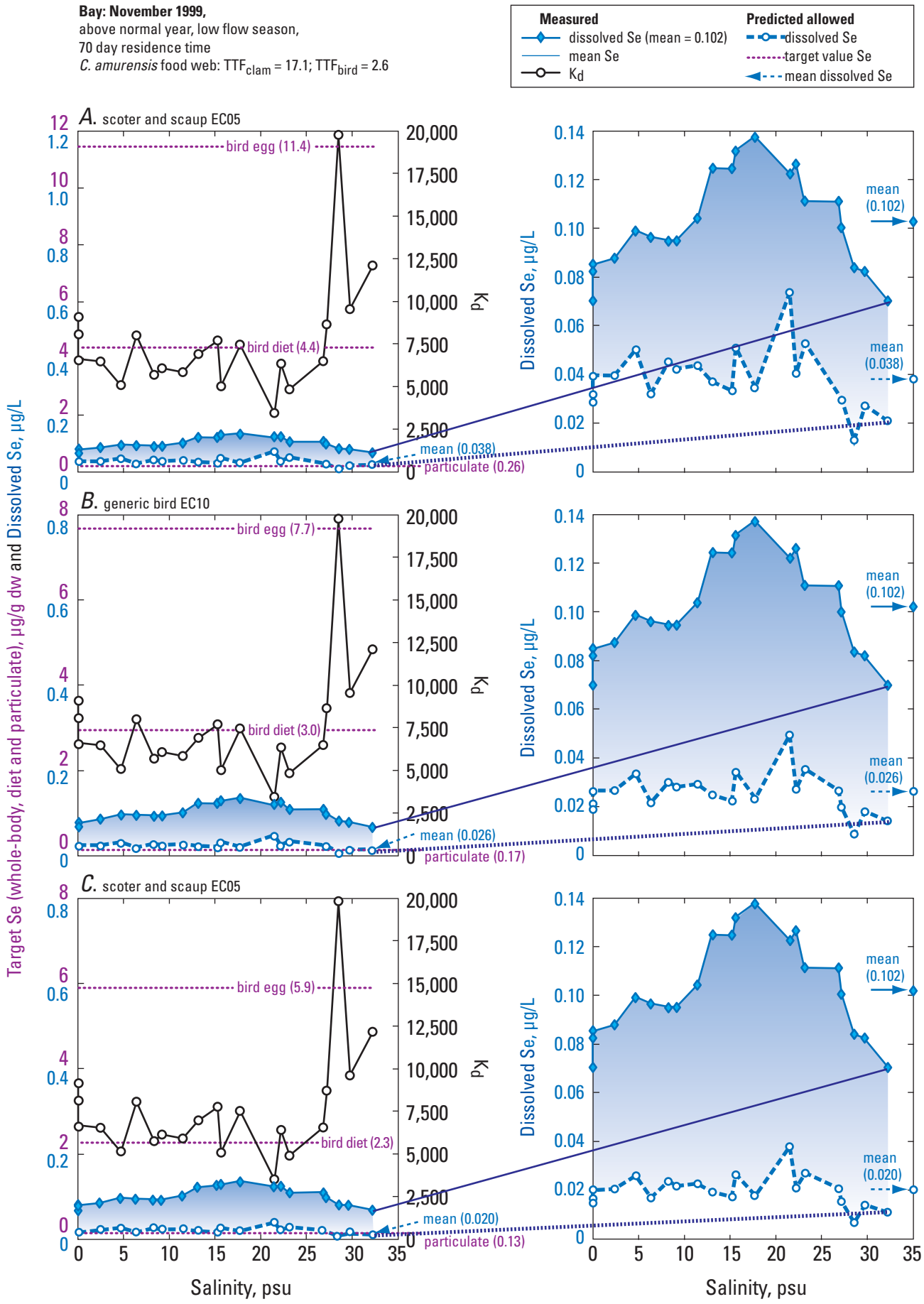


Figure 24. Modeled scenarios for protection of clam-eating bird species showing predicted allowable dissolved, suspended particulate material, and dietary selenium concentrations for the Bay. [Predicted allowable selenium concentrations are keyed to calculated Kds across the estuary for November 1999 (above normal year, low flow season). Measured dissolved and suspended particulate material selenium concentrations are given for comparison.]

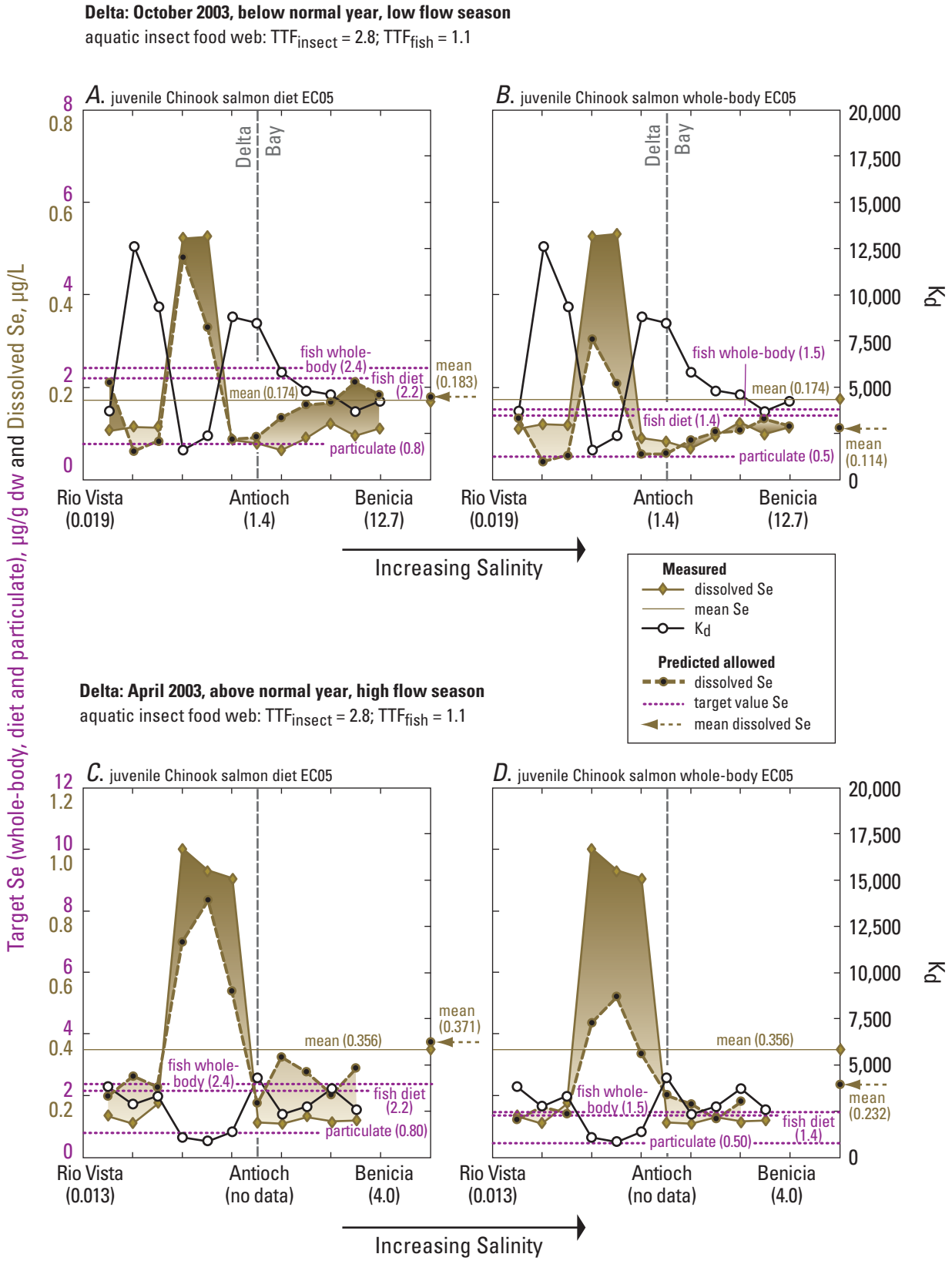


Figure 25. Modeled scenarios for protection of juvenile Chinook salmon showing predicted allowable dissolved, suspended particulate material, and dietary selenium concentrations for the Delta. [Predicted allowable selenium concentrations are keyed to calculated K_ds across the estuary for October, 2003 (below normal year, low flow season) and April, 2003 (above normal year, high flow season). Measured dissolved and suspended particulate material selenium concentrations are given for comparison.]

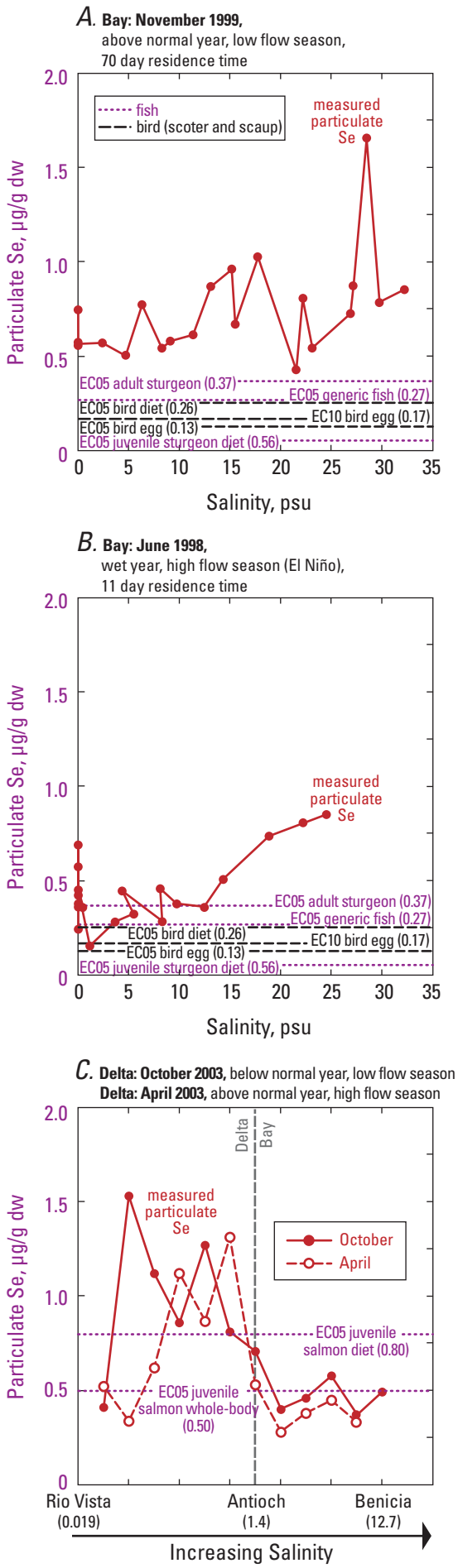


Figure 26. Observed and predicted allowable suspended particulate material selenium concentrations for modeled clam-based exposure scenarios in November, 1999 and June, 1998; and insect-based exposure scenarios in October, 2003 and April, 2003.

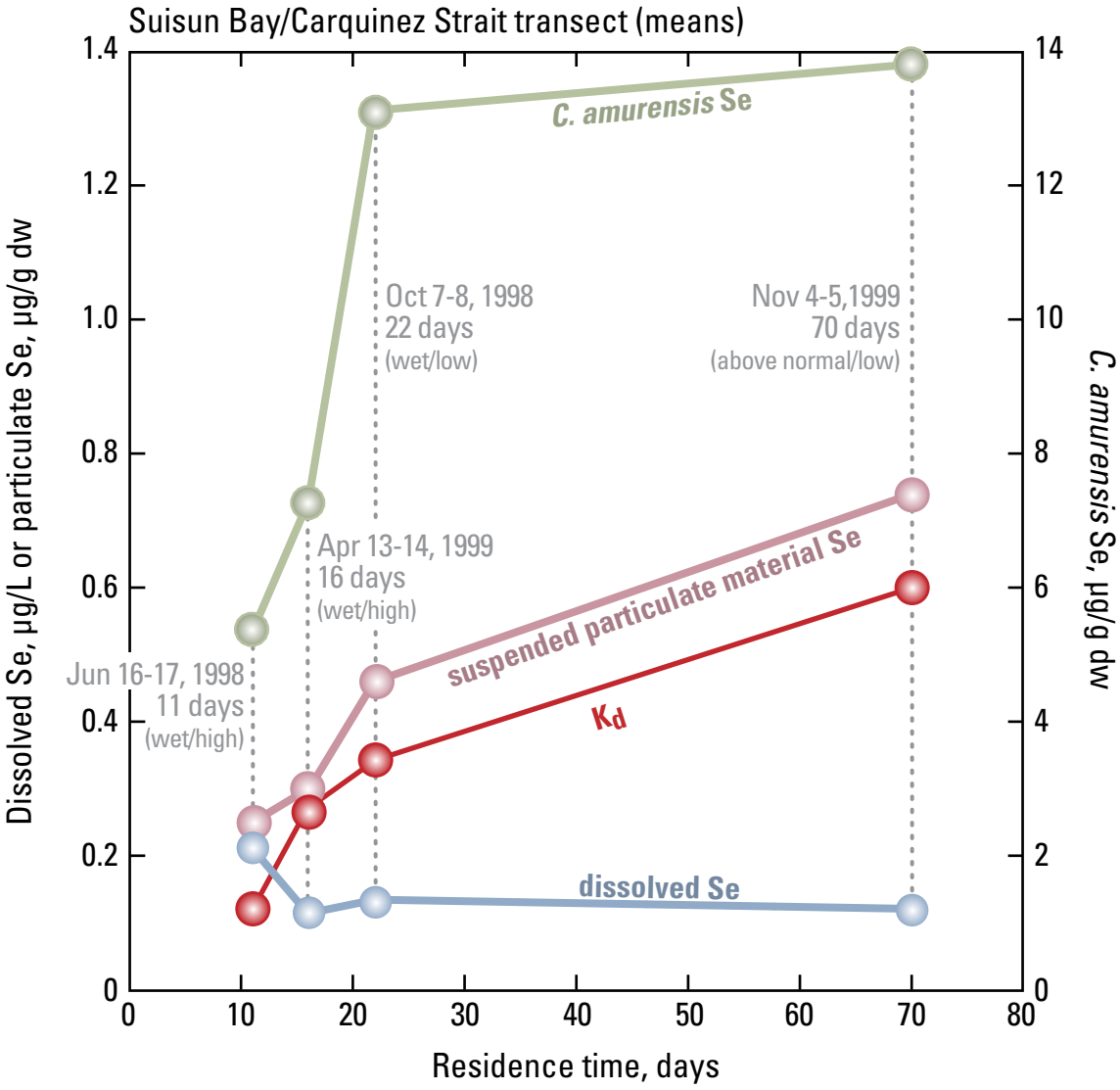


Figure 27. Change in mean observed dissolved, suspended particulate material, and *C. amurensis* selenium concentrations during transects in 1998 and 1999 as a function of residence time.

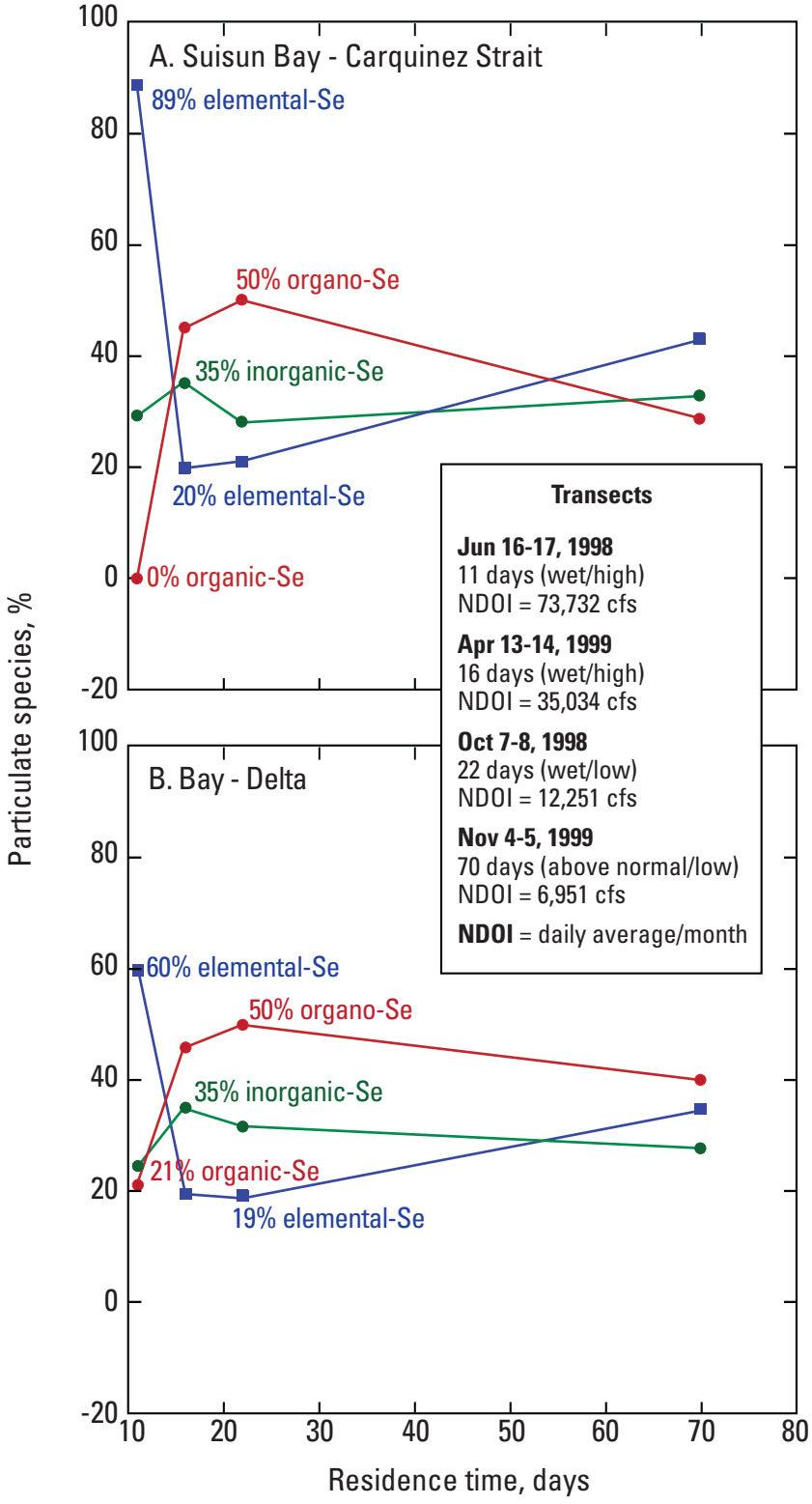


Figure 28. Change in mean observed suspended particulate material selenium species during transects in 1998 and 1999 as a function of residence time.